

CHARLES OGILVIE FARQUHARSON, 1888-1918.

By Prof. E. B. Poulton.

THE fine and accurate observer whose letters and collected material form the subject of the following memoir was born on February 13, 1888, on a farm at Murtle, in the valley of the River Dee, a few miles west of Aberdeen. At the age of about eleven he went to Robert Gordon's Secondary School, where it is remembered that he worked well and took a good place; also that country walks were a greater attraction to him than games.

In October, 1905, he entered the University of Aberdeen, at first as a student of English, Latin and Greek, but changing to Natural Science in July, 1907. His letters supply plenty of evidence that the two years at Classics had left a strong and lasting impression. Out of many passages I select the following because it also brings out his love for the insects he was studying. The name "*parsimon*," which filled him with horror, was given to a West African Lycaenid butterfly by no less an authority than Fabricius, the favourite pupil of Linnaeus.

" '*Parsimon* ' calls only for compulsory Greek for science students: [see also p. 398]. There ought to be a sub-committee of the 'Entomological' for the protection of the good name of nice insects, with special reference to such fair masterpieces of Nature's handiwork as the Lycaenids. Yesterday I saw a beautiful 'Copper,' probably only a few hours after emergence [see p. 380]. It was simply too beautiful to capture. I hoped that one day I might breed a few out, to keep some and let the others away, just in case there might not be enough to keep the race going [Dec. 9, 1917]."

After graduating as M.A. in 1908, Farquharson continued his scientific work for the B.Sc. which he took "with special distinction in Botany," in 1911. He entered upon this science in April, 1908, and then first came under the influence of the great and inspiring teacher, the late Prof. James W. H. Trail, one who did not treat Botany as an isolated subject but always brought the relation between plants and animals before his pupils. Prof. Trail remembered that Farquharson, when a student, possessed "unusual power in distinguishing the essential from less

important matters in each problem that presented itself to him, as well as in working out solutions to these problems, so as to make each addition to his knowledge a real gain" (C., p. 139).

Prof. Trail also told me that Farquharson was "one of the best among the many who have passed through our University; and I felt," he wrote, "no doubt as to the quality of the work that was done by him, for he was thorough and forgetful of self in whatever he undertook, and the love of natural science was inborn in him, along with exceptional ability."

For all his hard work and keen interest in many studies Farquharson entered with avidity into the literary and social life of the University, taking an active part in the Debating Society, the Sociological Society, of which he was at one time President, and editing and writing for "*Alma Mater*." His friends too "recall many long evenings in his company in bygone days, when a few kindred spirits were wont to meet to settle all the problems of the universe" (B.).

In 1911 Farquharson was appointed Mycologist to the Agricultural Department of Southern Nigeria—happy in finding a career in the one subject which attracted him most. Before starting, early in 1912, to West Africa, he spent some months of specialised study in London, chiefly at Kew. It was probably at this time that he came under the second great influence which affected his whole outlook. How much he owed to the late George Masee is best expressed in the words of one of his last letters.

"I ought to add," he wrote to Dr. A. W. Hill, F.R.S., on August 23, 1918, "that George Masee's economic-mycological outlook has influenced most things I have done, perhaps not as published, but in the intimate expression of his views that he used to give at Kew. Again and again I have wished he were alive. Kew wasn't the same place to me last time I was home" (D., p. 354).

The Agricultural Department, which, except for his visits to Agege and other places in Southern Nigeria and his leaves in the Old Country, was to be Farquharson's home for the rest of his life, is situated at Moor Plantation (480–580 ft.), about 4 miles west of Ibadan, and here the great majority of the observations recorded in this memoir were made. His first researches, upon the Mycetozoa, appeared in an important paper written in collaboration with Miss

G. Lister, the distinguished authority on the group (*Journ. Bot.*, vol. liv, 1916, pp. 121-33, pl. 541).

Farquharson had been a year at Moor Plantation when he came under a third great influence, and one which was to determine the direction of his later researches; for, in May 1913, W. A. Lamborn, an extraordinarily keen and accurate observer of insect life, became his colleague as Government Entomologist.

How his interest came to be aroused is told in a letter written to me on February 10, 1914:—

“I have to thank you for your most kind and encouraging letter which I received by last mail and for the many kind references to myself in your letters to Dr. Lamborn. I greatly fear, however, that you are giving credit where very little is due. Perhaps he has not explained how I came to bring him in the specimens which he generously contributed in my name to the Hope Collection. In my spare time I was collecting some fungi for Kew and Myxomycetes for Miss Lister, and of course in passing I met with some insects that looked interesting which I took to Dr. Lamborn. Under the stimulus of his enthusiasm I became interested in the curious habits of many of the insects and wrote one or two notes at his suggestion.

“It is largely due to the Myxos that the work was done. One has to look rather closely for these, and the relatively gross, if I may so use the word, phenomena of insect life could hardly be overlooked. On Moor Plantation, I am happy to say, I have since the beginning of August found nearly thirty species of Myxos, nearly half of which are new African records. The dry season has stopped this work for the present and I have in consequence taken to the insects.”

And later in the same letter, referring to the suggestion that he should join the Entomological Society:—

“There is no withstanding Dr. Lamborn, and under his inspiration I may manage to do something which will enable me with less unworthiness to join the Entomological.”

Although Lamborn and Farquharson were only together for twelve months, the inspiration of which he spoke remained and grew with every fresh discovery and was strongest in the last year of his life. His original observations in this short period were described in eighty closely packed quarto pages, written between September 9, 1917,

and August 31, 1918 (p. 401), just before he sailed in the ill-fated "Burutu." It is a pathetic thought that these pages in twenty separate letters, and all the packets of specimens illustrating them, should have arrived safely in England while the author was lost.

His consignments of rare and interesting specimens were so numerous that it was suggested that the museum would gladly bear the expense, but he at once replied: "I'll be only too pleased to send at my own charge. I simply wouldn't dream of anything else. . . . I'm practically a non-smoker and a most temperate person too, and I *must* help the revenue somehow. . . . If what I manage to do would help to clear up even a very small point of Lycaenid relationship I'd consider any personal outlay most amply and gloriously rewarded."

Thinking of all that he owed to Aberdeen, Farquharson was anxious to collect examples of butterfly mimics and their models for the Zoological Department of the University; for, as he wrote, they "might inspire some student to do a little as Lamborn did me."

The friend of whom he so continually spoke with gratitude has recalled memories of their year together at Moor Plantation:—

"I first met C. O. Farquharson in the spring of 1913 when I entered the Government service as Entomologist. He had completed his first tour of a year, and had just returned from leave.

"Our laboratories, under a common roof, adjoined; and a community of interest in scientific work soon put us on a very friendly footing. As a worker I found him most indefatigable. It was his practice, almost as soon as day broke, to walk round the experimental farm, searching for and examining fungi of economic importance. During the later official working hours of the day he devoted himself conscientiously and exclusively to the study of material gathered earlier, making microscope preparations, preparing cultures, and reading up original descriptions; for he had a sound knowledge of modern languages. In the early evening, when he might reasonably have rested, or at all events indulged in some physical relaxation, his untiring enthusiasm again led him forth, this time to explore the far wider field of the almost virgin bush near by.

“He was keenly interested in animated nature and from time to time had asked concerning the habits of the numerous insects he had seen. But his first active interest in Entomology was, I believe, awakened by the discovery of beetles in various instars in some of his beloved fungi, the Polyporeae. An examination of some Lamellicorn larvae in the fungi led to a discussion of the habits of the group as a whole, and the natural agencies which might limit the numbers of insects in general. He had not heard of the various parasites, or of the ways of the Fossorial wasps; and a long talk induced us to sit, as I well remember, being very contrary to my fixed habits in the Tropics, well into the small hours of the night.

“Of a romantic nature, he revelled in the study of the romance of insect life, and at about that time I was so fortunate as to throw some light on the value in sexual selection of the wonderful mandibular processes of the Eumenid *Synagris cornuta* Linn [Report, Brit. Assoc., 1913, p. 511]. Thereafter Farquharson vied with me in the study of the Hymenoptera, working still harder during leisure hours, and joining me in my laboratory after the evening meal, so that we could compare and discuss the results of excursions made together on Sundays, and independently on week days.

“The habits of Lycaenidae, the most interesting of all butterflies both as larvae and imagos, then claimed his attention: for I was able to show him various ant-attended and predaceous larvae, and therefrom originated the splendid new discoveries concerning the group with which his name must always be associated.

“Farquharson was a most versatile and widely read man. He had a sound knowledge both of French and German, and was familiar with the Classics, having a pleasing little habit of capping remarks, often in letters, with an appropriate quotation in Greek or Latin. He had in addition that broad general foundation of scientific knowledge which seems so especially to be built up by the teaching of the Scottish Universities, enabling him to turn with equal readiness to the study of the sciences both of Mycology and Entomology.

“His premature loss must be a bitter blow to Mycology, but, as a student of insects realises, especially to Entomology in the African Tropics, for far more investigation, on the West Coast particularly, is now called for to

complete the various researches already initiated by him.

"The additional losses of C. Mason in Nyasaland, and of H. Dollman of N. Rhodesia, workers of promise, both through illness contracted while on duty, are a further setback to the advance of the science, inasmuch as, in spite of the vastness of the British African possessions, the number of enthusiastic workers is so very limited, the Governments not yet being alive, apparently, to the paramount importance of Entomological research.—W. A. L."

In his admirable letter to Dr. A. W. Hill (D.), Farquharson gives, as Prof. Trail wrote to me, "an exceptionally good statement of such work as fell to him and of how to face it," and the letter was reprinted in the "Aberdeen University Review" (E.) because Prof. Trail wished his students to read it.

Farquharson's main object in this letter was to emphasise the essential importance of understanding all that promotes the healthy life of the normal plant, and of looking, in the first instance, to the conditions of growth rather than to the *deus ex machinâ* of a parasitic fungus or insect enemy.

He believed "that every mycologist ought to be deprived of his microscope (and perhaps even of his pocket lens) for at least the first tour of his service, and perhaps for two years, and compelled to raise *normal* crops with no artificial aids of any sort" (D., p. 354).

"The essential remedy" for palms supposed to be dying from the attacks of *Bacillus coli*, he found to be "proper cultivation, growing . . . in the proper place on a proper soil in the proper way, with plenty of light and air" (D., p. 359).

And he was always ready to make fun of an excessive eagerness to rely upon "economic" methods. Thus, when he found, for the first time in Africa, gnats of the genus *Harpagomyia* being fed by *Cremastogaster* ants, he wrote:—

"Our sanitary authorities if they get wind of this, will have out an Ordinance decreeing the destruction of all *Cremastogaster* nests, ranking them with the neglected sardine tin as friends of the mosquito and foes of humanity. I once heard an authority on these matters declare that

on any station of which he had charge, he would never allow anyone to grow a Pawpaw. Did we not know that it was the favourite food of the ♂ mosquito? Starve them then; make them die of inanition and the ♀s not being hermaphrodite and autogenous, would likewise sink into a decline. Alas for the eupeptic pawpaw! Of course, coming as I do from Scotland, I may have failed to notice that he was jesting. But he was (I regret to say) a Scot too, and if one Scot can't tell when another Scot is jesting, who can, I ask?"

Farquharson's years at Moor Plantation during the war were full of anxiety and discomfort. His brother was in the trenches in the Ypres salient and was wounded in October, 1917. One of his leaves home was saddened by the death of his father in 1916. Then, in his last two years there was much sickness in S. Nigeria, although Farquharson himself kept well, a result which he attributed to his out-of-doors study of natural history. Thus he wrote on August 14, 1918:—

"There is not much room for what one might call the higher life. A short evening for tennis and a long one for cards and drinking about sums up the average official's life outside the drab round of the office. Without a decent hobby I don't think I could have stuck this long tour, and it has been a very great pleasure to me to try to fill up some of the few lacunae in Lamborn's work, however imperfectly. I hope I may be able to do more, but I am grateful indeed for the chances I've had to do even a little."

And earlier, in November, 1917: "When I am finding things, really good ones, I must say I never think of the possibility of going sick. The worst that can happen to me here is to have time to worry."

Farquharson considered, contrary to the usual belief, that the "dry season in many respects is not superior to the wet, up-country at least," and that "it is in the dry season that men get run down, although the effects only come out in the wet."

But, however refreshing the rains may be, there appears to have been too much of a good thing in 1917, when he wrote: "I spent the whole of a wet September here. In my bush hut there was only one dry 'island' when it

rained, and that was my camp-bed over which I had slung a ground-sheet. Nice little Hepaticas and graceful little ferns are growing on the mud walls. I think it must have been the fact that I couldn't help laughing at it all, that kept me well. It wasn't official solicitude for my welfare. There were no funds available to buy thatch which, strange as it may sound, is hard to get here. And then I got that wonderful *Lycaenid* find [p. 393] and one or two others."

Another discomfort was an indirect result of the war—the disorganisation of work in his Department, bringing uninteresting columns of accounts and the management of labour. "I haven't got near my own office the whole tour and am only mycologist in name," he wrote in September, 1917. And nearly a year later:—

"I have been having a most tiresome time doing up arrears of work (not my own) before going on leave. I wouldn't mind doing overtime or interesting work, but what I am doing any native clerk could do, a dreary totalling up of columns of labour expenses in the working of this plantation. I suppose I'll get to know how much it takes to hoe or weed acres of crops (without the aid of any labour-saving machinery and by methods impossible to apply commercially); but how I detest the work! However, the mail took my mind off the dreary business."

And here too, as he wrote on another occasion of the same uninteresting work: "If it weren't for the ants and the *Lycaenids* I'd be ill off indeed. Man cannot indeed live by bread alone."

The submarine campaign was at its worst on the West Coast, and Farquharson was always full of anxiety about his notes and precious parcels without which his observations would lose nearly all their value. He was continually hearing of disasters, and losses among his friends, and words written in December, 1917, were prophetic of his own fate on the "Burutu":—

"I hear that over twenty Nigerian passengers were drowned—off Holyhead, too, almost within sight of home! Another Hohenzollern laurel!"

As in his letter to Dr. A. W. Hill (D.), so, continually in his letters to me, Farquharson referred, with anxiety and evident foreboding, to the submarine menace. Of several passages from his letters already published (C., pp. 141, 142), I here reprint a single one because it is so clearly written in the spirit of a last message. It is very

touching that he should speak as he does of work which gave me quite as much pleasure as it gave him.

“The submarine statistics naturally have most interest for those about to go home. I do hope I may get safely through and back, but if not it cannot be helped. Before I close, however, and in case this might be the last of me, I would like to thank you again for the great and kindly interest you have taken in the little bits of things I have been able to do, not to mention the patience with which you have tried to guide me. I’ve no doubt if I get no other chance to do better, somebody else will. [Aug. 14, 1918.]”

But he felt, after his long stretch of twenty-three months on the West Coast without a leave, that “three months at home is something worth taking a risk for,” and he was longing “for a sight of Scotland.”

The memories of survivors, recorded in letters and in “West Africa” for October 12 and 19, 1918, bring before us a vivid picture of a voyage in the Great War. The “Burutu” left Lagos on September 2, a day later than Farquharson had supposed, and reached Freetown, Sierra Leone, on the 7th. Here labour, reduced by influenza, required twelve days for taking in coal, water, etc., and the mails were transferred to the Escort-ship of another convoy. When they sailed on September 19 the “Burutu” was one of nine steamers, including three troopships. The voyage was uneventful until about October 1 when it became very cold and the sea rather heavy. At about this date destroyers met the convoy and took six steamers to southern ports, the remainder being escorted north by one destroyer and two “Mystery” ships.

At about 11.0 p.m. on October 3, cold and wet with a rough sea, the “Burutu,” steaming without lights, within three hours of Holyhead, was run down in the darkness by a larger vessel, the “City of Calcutta.” Then came a second collision with the same steamer, and this cut the boat clean in two and she sank in eight or nine minutes after the first blow—“lost just as fully through the Germans’ unspeakable sea practices as if they had torpedoed her.”

Some boats and gear were carried away, others capsized when lowered, and, although the “City of Calcutta” did what she could, it was only possible, in the heavy sea and

intense darkness, to rescue a small proportion of the passengers and crew.

Captain W. E. Potter was on the bridge directing till the last moment when he told the passengers to save themselves, and went down with his ship. There was no rushing about or disorder of any kind although for part of the time after the first collision all lights were extinguished and friends could only recognise each other by their voices.

Mr. A. J. Goodwin, Executive Engineer of the Public Works Department, Southern Nigeria, Farquharson's cabin companion, remembers his high spirits on the voyage and his energy in the deck games, when, with a "brither Scot," he tried to knock spots off the Sassenach. He was the expert on the War, and, with his large maps, most helpful when the daily wireless arrived. With the other passengers he took his share of watches, an hour-and-a-half each, in the danger-zone, and his friend thinks that he was on duty that last evening up to 7.0 p.m. Mr. Goodwin found him just after the first collision getting his coat and life-belt on in the cabin. He was quite cool and collected, and being ready first, was on deck before his friend. Then came the second collision and they saw each other no more. Mr. Goodwin thinks that he may have been in an overturned boat from the keel of which six survivors were rescued after about nine hours. His body was found off the Welsh coast and buried at Aberdeen.

The words of his first great teacher in science are a fitting conclusion to this brief life of an exceptionally gifted and exceptionally well-trained naturalist.

Among the sons of the University of Aberdeen who "have toiled and died in many lands and seas in the service and defence of the British Empire, of freedom, and of the just cause . . . none was of higher promise or gave more faithful service than Charles Ogilvie Farquharson. . . . His personal friends will retain the memory of an earnest, unselfish, and fearless seeker after truth, of great ability, but most free from vanity, ready at all times to help others by deed as well as by word, whose death has brought to them a sense of grievous loss" (C., pp. 138, 140).

- A. "Nature." Vol. cii, 1918-1919, pp. 192 and 371 (referring to D).
- B. "Alma Mater: Aberdeen University Magazine." Vol. xxxvi, No. 1, December 4, 1918, p. 2. Written by two College friends.
- C. "The Aberdeen University Review." Vol. vi, 2, No. 17, March, 1919, pp. 138-143. By Prof. J. W. H. Trail and Prof. E. B. Poulton. Contains a complete list on p. 143 of his Entomological publications in Proc. Ent. Soc., Lond., 1913-1918.
- D. Royal Botanic Gardens, Kew, Bull. No. 10, 1918, pp. 353-361. Contains a long letter dated August 23, 1918, from C. O. Farquharson to Dr. A. W. Hill, F.R.S., Assistant Director.
- E. Reprint of above in Supplement to "Aberdeen University Review," March, 1919, pp. 193-200.
- F. Proceedings of the Entomological Society of London, 1918, pp. clxvii and clxxx.

INTRODUCTORY NOTE (E.B.P.).

It will be obvious to the reader that this memoir was never written or intended to be published as a scientific paper. The author wrote hurriedly and freely of the observations which had interested him and the material he was sending. He wrote in the intervals of a very hard-worked life in the Tropics. Had he lived, several formal papers would have appeared, each dealing with a separate subject. But, as this was not to be, it seemed best to analyse the whole correspondence and to group the contents according to the subjects treated of, combining with each an account of the illustrative specimens and a record of the brief accompanying notes. These accounts precede the groups of extracts from letters, and, being editorial, are enclosed within square brackets, as also are any substantial additions to the extracts themselves. Slight verbal changes, to the making of which the writer had freely consented in his lifetime, are not indicated, and it has not been thought necessary to add name or initials to the bracketed words. A single pair of brackets has been considered sufficient to indicate the authorship of two or a few consecutive paragraphs, but when several are included, initials have been added.

In the systematic and descriptive appendix, where the

editorial additions are much shorter and fewer, it has been thought better to add the initials E.B.P. as well as the usual brackets.

The authorship of footnotes in both text and appendix is indicated by initials, except in purely formal editorial notes.

In the frequent references to the Proceedings and Transactions of the Entomological Society of London the abbreviated forms Proc. and Trans. Ent. Soc. have been employed, Lond. being usually omitted.

The great majority of the letters were written at Moor Plantation (p. 326), and this place is to be understood in the absence of any indication at the head of an extract. The only other locality which appears at all commonly is Agege (152 ft.), sixteen miles north of Lagos, where there is a Government farm often visited by Farquharson. The few remaining localities are described when first referred to in the extracts.

The material has been mounted and labelled with the greatest care by Mr. A. H. Hamm and Mr. J. Collins of the Hope Department, and by Mr. H. Britten, formerly of the Department, and I desire to express my thanks for their valuable help in this intricate work.

The specimens may be studied in the Hope Department; also, as regards some of the types, co-types or para-types of certain species, in the British Museum (Nat. Hist.) and in collections of the authors.

It is hoped that the detailed table of contents will be a sufficient guide, and, as regards subjects, an index, to a memoir which is, of necessity, varied and elaborate.

A glance at this table will show how very much has been contributed by the distinguished authorities who have worked out the author's material, and have thus done so much for his memory.

I also wish to express warm thanks to the following eminent specialists who have given the kindest help:—

G. J. Arrow, Maj. E. E. Austen, D.S.O., H. A. Baylis, D.Sc., Prof. M. Bezzi, K. G. Blair, Prof. G. H. Carpenter, B.A., D.Sc., W. C. Crawley, B.A., F. A. Dixey, M.A., M.D., F.R.S., H. St. J. K. Donisthorpe, F.Z.S., E. A. Elliott, F.Z.S., C. J. Gahan, M.A., D.Sc., J. J. Joicey, F.L.S., Dr. K. Jordan, Ph.D., C. G. Lamb, M.A., W. A. Lamborn, G. A. K. Marshall, C.M.G., D.Sc., The Rev. F. D. Morice, M.A., S. A. Neave, M.A., D.Sc., L. B. Prout, Capt. N. D.

Riley, The Rev. Canon K. St. Aubyn Rogers, M.A., Hugh Scott, M.A., Sc.D., Miss Lorrain Smith, T. A. Sprague, O. Stapf, Ph.D., F.R.S., G. Talbot, W. H. T. Tams, and Rowland E. Turner.

Although the present memoir cannot claim the precision and condensation of a formal scientific paper, it is given, by the author's letters, a character and charm of its own. We are often made to feel as though we were present with the writer and sharing all his enthusiasm and delight. For this reason a statement made in an earlier letter is retained in a later one if its omission would weaken the freedom and force of a description.

Furthermore, the author's letters bring home to us more intimately than would be possible in more formal writings the stimulating and encouraging knowledge that one who, at the start, was not an Entomologist, one whose days were filled and overfilled with other work, should have been able to do so much for Entomological science.

A. OBSERVATIONS ON LEPIDOPTERA, ESPECIALLY THE LIFE-HISTORIES OF LYCAENIDAE IN THEIR RELATIONS TO ANTS.

I. LIPTENINAE: INTRODUCTORY NOTE (E.B.P.).

Almost nothing was known of the life-history and earlier stages of the Lipteninae until the publication of W. A. Lamborn's paper in *Trans. Ent. Soc.*, 1913, p. 436. Aurivillius, in "*Rhopalocera Aethiopica*," gives only two references—(1) to Roland Trimen's brief account and figures of the larva and pupa of *Durbania amakosa* Trim. ("*South African Butterflies*," vol. ii, 1887, p. 216; vol. i, 1887, pl. ii, figs. 2, 2a); (2) to his own paper in *Ent. Tidskr.* (vol. xvi, 1895, p. 207, pl. ii, figs. 1, 1a, 1b), describing Sjöstedt's discovery of a larva and two pupae of *Hewitsonia kirbyi* Dewitz on the whitish grey, rather mottled bark of a tree. They closely resembled the bark and were very difficult to find. The description of both stages and the figure of

the pupa show great similarity to several of the Liptenines collected by Farquharson and described and figured by Dr. Eltringham in the present paper. The larvae of *D. amakosa* were gregarious and fed upon a common species of grass, *Anthistiria ciliata*. Numerous pupae were grouped close together, attached by a slight silken web to a rock. Nothing was known of the food-plant of *Hewitsonia*, but it is now certain that the larva had fed upon the filmy lichen encrusting the bark.

Lamborn's paper referred to on p. 337, with Dr. Eltringham's description and figures of *Euliphyra* (*ibid.*, p. 509, pl. xxviii), brought a great advance; for we are here given an account, on pp. 446-457, of the larval and pupal habits of three species—*Aslauga vininga* Hew., *A. lamborni* Beth.-Bak., and *Euliphyra mirifica* Holl., and the pupal habits of three species of *Epitola*, viz. *ceraunia* Hew., *carcina* Hew., and *oniensis* Beth.-Bak. Furthermore all six species are shown to be related to ants—for the first time in the Lipteninae. The larvae of the two first-named species fed upon ant-tended Coccidac, while *Euliphyra* was fed by the ant *Oecophylla*. It is unlikely, however, that such food is primitive in the Lipteninae any more than in the Lycaeninae; and we owe to Farquharson the important discovery, briefly announced in Proc. Ent. Soc. 1917, p. lxi, that bark-encrusting lichens on trees bearing the carton nests of *Cremastogaster* ants form the food of many Liptenine larvae—in fact, with the exception of the grass eaten by *Durbania*, the only larval vegetable food-plant at present known in the whole group. When we reflect that this, for a Lycaenid, extraordinary larval food is common to forms so different as *Teruloneura*, *Hewitsonia*, *Epitola*, *Iridopsis*, and *Citrinophila*, it becomes certain that it is wide-spread among Liptenines, and possibly their primitive food-plant.

In addition to this great increase in our knowledge, Farquharson shows that some of the imagines feed upon secretions of ant-tended Coccids and plant-glands, and even drive away the ants.

Dr. Eltringham's descriptions and beautiful figures (pp. 473-89, Pls. XII, XIII, fig. 3) include not only the fine material sent by Farquharson but much of Lamborn's as well; and, combined with his account of *Euliphyra* (*l.c.*), they give us a wide survey over the earlier stages of this most remarkable group of butterflies.

A. TERATONEURA ISABELLAE DUDGEON.

[Farquharson's first *Teratoneura* was a female taken at Moor Plantation, Dec. 12, 1913, in the act of drinking the secretion of ant-attended Coccids on a twig near the Apocynaceous *Cremastogaster* ant-tree *Alstonia congensis*, on which larvae and pupae of the Lycaenid were afterwards found. The following letter was written to his friend W. A. Lamborn, the others to me.]

Moor Plantation.

Dec. 24, 1913.—In response to your request I am now sending you a few notes on the Lycaenid which I brought in on the 12th of this month.

About six o'clock in the evening I happened to pass the tree on which you had some time previously shown me some ant-attended Coccids. I was rather surprised to see a butterfly evidently in the act of sharing with the ants in the fluid provided by the Coccids. At the time, the Lycaenid was hanging from the underside of the twig with the wings outspread. Being unprovided with a net, I had to adopt the only other method possible, to catch it. Fortunately, owing to its intentness in supplying the wants of Nature, or to its natural "protectedness"—for even in the falling light it was by no means inconspicuous, I secured it easily with my fingers, and was pleased indeed that you regarded it as quite a prize.

Feb. 18, 1914.—I received the letter with the great news of *Teratoneura*, last mail, which pleased me very much indeed, but I hasten to explain that its ever having reached the Hope Department is due in the first instance to Dr. Lamborn. From the note which I made at the time of finding it, you will readily perceive that it interested me primarily from its being found in the act of sucking up a Coccid secretion. This was a new thing to me, though, of course, not to my friend. He told me so, but went on to congratulate me with considerable solemnity, so that I felt rather awed and inwardly congratulated myself that the creature had been so intent on its meal that I, without a net, and absolutely innocent of its possible identity, yet managed to catch it by the precarious method of the finger and thumb.

I wonder if any of us will ever penetrate the secret of the larval *Teratoneura*.

1. *The Life-history of Teratoneura.*

[The bred series of *Teratoneura*, illustrating the following sections, includes 8 males and 9 females from larvae on the bark of, or pupae on or near, the "ant-tree" *Alstonia*, already mentioned. The first, a male, A, which emerged about Dec. 9, 1916, at Agege, where Farquharson happened to be at the time, and the second, a female, B, emerging Feb. 15, 1917, are accompanied by their pupa-cases of which one, the male, is represented on Pl. XII, fig. 9; see also p. 477. The remaining 15, emerging Feb. 24–March 8, 1917, are also indicated by letters for their respective pupae, but these were never received, although two parasitised pupae were sent (p. 459) together with two spirit specimens of the extraordinary larva described and figured by Dr. H. Eltringham (p. 476, Pl. XII, figs. 7, 8, 14, 15).

The pupal period of one female was 10 days—pupation Feb. 14, emergence Febr. 24.

The following notes on 8 specimens indicate that emergence usually takes place about noon or within the 2 or 3 hours after it: ♀ before noon; ♂ about noon; ♀ a little after noon; ♀ about 1.0 p.m.; ♂ after 1.0 p.m., probably about 2.0; ♀ 2.30 p.m.; ♂ after 2.0 p.m.; ♀ p.m.]

Feb. 22, 1917.—I send you two butterflies with their pupa-cases. One I got just before going to Agege in December. I had to take it with me and it emerged there. I have seen no more of them till lately, when I have secured about a dozen pupae which I now have. Very likely Lamborn has sent them before, but they are new to me. I send one authentic larva which I put into spirit yesterday. When alive it is very Lymantrid-like, with bright colours and spots. The pupa is a "decayed"-looking thing, like a mouldy object of some kind, till it is closely examined, when it is wonderfully fine. When the first butterfly emerged I thought a Skipper had got in by mistake. The resting position is very Skipper-like. I have now seen quite a number of larvae of which I will write to you more fully later. This is simply a hurried foreword. They have legs like *Hewitsonia* larvae and run about among the ants in the same way—*Cremastogaster* as before.

May 18, 1917.—I got the great news that it was *Teratoneura* that I'd got hold of after all. I am sending you the rest this mail and hope to send their pupa-cases and one

or two parasitic Chalcids next mail. I'll be so vexed if submarines get this lot. I'm really nearly afraid to send at all, but the wet season is setting in and things are apt to spoil if kept. I will answer all the points you raise in detail next mail, which will be in about a week, I think, for I cannot get time just now. It was indeed very odd that I should find the *Teratoneura* first and re-discover it even to its larva. I may say that the larvae that I had feeding were all definitely of the species, no question whatever.

I am especially pleased about the *Teratoneura*, because I really knew what I was after and managed to do it. Of course it would never have happened but for Lamborn, and it is so very kind of you to take so much trouble over it all.

2. The Larva of *Teratoneura*.

[The Lymantrid appearance of the larva was very evident in the spirit specimens and is shown in Dr. Eltringham's figure (Pl. XII, fig. 8; and the description, p. 477; see also p. 342). It is also the fact that *Teratoneura* is the only butterfly larva yet known which has the urticating type of spicules, although their effect has not been observed. Mr. W. A. Lamborn happened to be at home when the larvae arrived; he recognised them directly, but said that he had always mistaken them for moth larvae.

On Dec. 25, 1917, Farquharson bred the Lymantrid moth *Naroma signifera* Walk. from a larva on the Apocynaceous tree *Alstonia congensis*, on which *Hewitsonia*, *Teratoneura*, and other Liptenine larvae were found. The specimen was referred to on Jan. 26, 1918, in the following passage, in which "*Hewitsonia*" was probably written for "*Teratoneura*," although the former also appears on the notes accompanying the specimen: "The moth with the *Hewitsonia*-like larva is rather interesting. The larva is very like a *Hewitsonia* larva and lives on ant-trees (I have only, however, found two, and of these one was accidentally destroyed). It has two glands, in the mid-dorsal line on segments 9 and 10, protected by spines. Hardly any cocoon is spun—simply a few threads—and the cast skin is left hanging near the pupa." Further specially directed observations will be required in order to test the conclusion that these larvae always feed on ant-trees and are the models of *Hewitsonia*, *Teratoneura*, or other Liptenine larvae. *Naroma signifera* is an extremely abundant and

wide-spreads pecies, bred in large numbers by Lamborn at Oni and by Carpenter in Uganda, and ranging to Natal. The two mid-dorsal glands are characteristic of Lymantridae.]

March 1, 1917.—The larvae are very remarkable, being very hairy, and, on the naked parts between the tufts and bands of hairs, brightly pigmented with red, green, yellow, and perhaps other colours—such colours as one associates with Lymantrid caterpillars. The larva is more moth-larva-like even than *Hewitsonia*, though of the same general character, even to the little “sucker” that is found on the outside upper edge of the pro-legs [pp. 352, 355, 383, 485], which is retracted when the foot is lifted and exerted when it touches the bark of the tree or whatever the larva is walking upon.

3. *Teratoneura Larvae and Ants.*

March 1, 1917.—The fact recorded in the last paragraph [of the section on Pupation, p. 346] led me to look for evidence of attacks by the larvae on Coccids, but with entirely negative results. Except when about to pupate they are never found on leaves nor among the Coccids. Up and down the stems of the two big trees a busy column of ants in loose formation about 5 to 8 deep is constantly running. They do not appear to stop night or day, for I have gone down after dark to see if the larvae could possibly be night-feeders. I have seen several larvae on the way to pupate wandering down the column in a leisurely way; ants coming in the opposite direction turn aside, those coming behind keep a respectful distance. There is no hostility shown, nor yet friendly attentions such as mark their behaviour to possessors of Guenée glands. It is really extremely difficult to get the larva to leave the ant-column. I have pushed them away, but they persistently return. A tiny twig intruded among the ants is immediately attacked.

4. *The Larval Food of Teratoneura.*

March 1, 1917.—I haven't seen any of them feeding so far, as I have seen *Hewitsonia* larvae, at least apparently feeding. I think they feed high up the tree, but I have examined the frass microscopically and am to send you a specimen or two by this mail [not received]. It is a mixture of vegetable débris of a very odd kind, little bits of tissue, I think cortical, largely sclerenchymatous in one or two smears I have made—I got a fine bunch of store-cells in one, fungus

spores mainly referable to phaeosporous Hyphomycetes, hardly two spores being alike, just such a collection as one could scrape off a bit of "clean," living bark (that is not decayed); very little fungus mycelium—so far as I have yet seen—except fragments of brown-coloured hyphae; numerous Algal elements, not filaments but sporing or resting stages. I am on the whole inclined to believe that they are lichen-feeders, but I intend to go into the question more fully, for *Hewitsonia* larvae are now beginning to appear. I am also to compare frasses of different larvae of known food-plants. If they were bark-feeders there would be a larger proportion of undigested cortical matter. Algal filaments would probably be more numerous instead of only sporing stages. I am inclined to think that the fungus constituent—at least hyaline mycelium—is digested. Resting brown mycelium might escape. At the moment I am ashamed to confess that I do not remember whether any group of lichens has a brown mycelium.* Brown spores are common enough, but I have an idea that the thallus is always hyaline. I will look up De Bary to-morrow. I remember at the time I found the *E. honorius* larvae [pp. 351–53] that some of their frass left in a jar, the walls of which were moist, formed centres for the growth, a vigorous growth, of filamentous Algae. Perhaps you may be able to induce some Algologist to try the experiment with the frass which I send you. If I lived in a forest district I'm sure I could quickly settle the point, but I feel rather confident of clearing up a good bit of the problem here.

Yesterday I liberated two (immature) of the hairy Lycaenid larvae [*Teratoneura*] after starving them for 24 hours. I put them in the ant-track on the bark of the tree. They appeared to start feeding at once, and

* Miss A. Lorrain Smith has kindly written on this subject:—
"Some few lichens have brown mycelium, but that is rather rare. What is almost universal is the brown under cortex and rhizinae of larger forms and the dark brown hypothallus of crustaceous species—the latter not so frequent.

"Bark lichens are a very favourite nidus for parasitic fungi. I often find very flourishing brown mycelium—stout hyphae—pervading the lichen fruits. There are crowds of minute fungi parasitic on lichens.

"The brown mycelium might thus be very easily explained as part of the larval food and may be either fungoid or lichenoid in origin."—E.B.P.

the ants simply walked round them. I then cut off a piece of the bark and enclosed the larvae in a perfectly clean tin. This morning I found fresh frass. The food material is about the most unpromising stuff I've ever seen.

March 18, 1917.—I have a nice series of the Lycaenid with the Lymantrid-like larva. There is no question about their not being carnivorous, nor leaf-eaters, nor flower-eaters, but cortex-feeders. I have not yet cleared up what part of the cortex it is of which they are specially fond. I am inclined to the lichen theory still, for I now know of two trees of distinct Orders on which the same larvae occur, one a *Ficus* (Moraceae, Tribe Ficeae), the other an Apocynaceous tree which I believe is *Alstonia congensis* (author's name [Engler] I do not know at present, but I will find out). Now these two Orders are widely separated, but have one thing in common—latex. But the larvae live on old bark and it cannot be the common factor, latex, that they are after, for they would have to do what a Bostrichid beetle could hardly do, and, as a matter of fact, it takes a good deep cut on old cortex to draw latex. The marks of their mandibles even when one sees them feeding are not visible to the eye, and what they take off must be a very thin layer indeed. The lichens on these trees are of the extremely thin crustaceous variety—so thin that they simply look like different coloured portions of normal cortex, and that makes observation all the more difficult.

5. *The Larval Food of Liptenine Allies of Teratoneura*—*Epitola*, *Hewitsonia*, *Iridopsis*, *Citrinophila*, *Eresina*.

Feb. 26, 1916.—I am practically satisfied that the whole group with hairy larvae, *E. honorius*, *Hewitsonia*, *Iridopsis* [including almost certainly *Citrinophila* and *Eresina*], feed on Algae or lichen on the bark of the trees on which they occur. I've examined frass of *Hewitsonia* and *honorius* too. However, I will I'm sure be able to confirm it next tour. The *honorius* larvae, as you received them, were shrivelled a bit, but in life they were exactly similar to *Hewitsonias*, so much so that I thought their brown colour as distinct from the mottled greyish-green of the *Hewitsonia* larva was a cryptic variation, as they were on a tree with brown bark.

March 18, 1917.—I am certain that *Hewitsonia* is of the same type as *Teratoneura*. Curiously enough I have seen

a *Hewitsonia* settling on the aerial rootlets of the *Ficus* on several successive nights lately. The *Epitola honorius* larvae are also, I am sure, of the same kind, and indeed their shape is exactly that of the *Hewitsonia* larvae, though their colour is brown, a snuff-coloured brown with plenty of hairs, giving them a moth-larva-look. The *Hewitsonia* and *Epitola* larvae are also alike in being rather broader anteriorly—with a square-shouldered sort of shape, as it were—than posteriorly. This is not quite so marked as in the *Teratoneura* larvae, but, now that I know a little about them, I would have no hesitation in associating them with Lycaenidae, and with each other among the Lycaenidae, if I saw them on ant-infested bark, the ants being *Cremastogaster*. The little Lycaenid [*Epitola concepcion* Suff.] that I sent, with the hairy larva and *Hewitsonia*-like pupa, is, I am certain, of the same order, as also is *Iridopsis*. I found at least three other larvae among ants of the same type last tour in travelling through a forest district, but couldn't do anything with them, as they were too young. I do wish I could get a month's holiday in a forest district, and I'm nearly sure I could work out as many of this type as Lamborn did of the others. It is rank bad luck being here for such work. I am very curious to know the systematic position with regard to each other of those I have just mentioned. Are they really closely related or is it a case of convergence? [They are certainly nearly related.] I have an idea in my own mind that this group of Lycaenids in a sense correspond to certain xerophytes of the plant world. A desert plant if put into competition with ordinary trophophytes and left to make the best of it is choked out by its better adapted rivals and perishes in the midst of plenty. In the desert it thrives in apparently starvation conditions, but the little there is is enough for the few that can stand the conditions. We can hardly imagine even Germany making war on the Eskimos, to use another analogy. It may be so with this group. What with poor fare and the ants, probably few insects would care to invade their field. One could imagine Satyrines being left to starve through an invasion of Army worm or Locusts.

Dec. 29, 1917.—The hairy, "eremobiotic" types, that live in a desert of ants, neither tolerated nor attacked but simply ignored, giving nothing and taking nothing of any consequence to the ants, though securing indirect pro-

tection, the Hewitsonias, Teratoneuras, etc., have of course quite visible heads. I use the word "eremobiotic" to express this insect counterpart of the desert "xerophytic" plant. Synockete implies a more intimate relation, more applicable, is it not, to guests (welcome or not) living *inside* the nests? Perhaps cremosymbiont, if that is a legitimate coinage, fairly nearly expresses the idea. Wasmann, according to Wheeler, uses the term trophobiosis to describe the more common relation of the Lycaenine Lycaenids. In a "trophic" classification of Lycaenidae the two terms contrast fairly naturally. They cannot be ranked with the scafferying* neutral synocketes, and I'm sure to most insects the "playing field," of a *Cremastogaster* colony especially, is a veritable desert. In case such a term were too particular, implying absolute proof rather than the more or less hypothetical, atrophic and syntrophic symbiosis is perhaps a better general description.

6. *The Pupation of Teratoneura.*

March 1, 1917.—The larva pupates either on a leaf or on a slender dead twig or dead herbaceous stem on the tree or round its base. The trees on which they are found throw out numerous very slender aerial roots, which hang down from the stem and branches. These are favourite pupation places. When these end in the air and not, as they sometimes do, become re-attached to the parent tree lower down, ants do not generally run down them. Such a place would be relatively safe at the critical, vulnerable period of transition. *Argiolas* pupae are generally to be found on shrubs or herbs at a little distance from the ant-tree, and when, as happens at times, they pupate on a plant too near the tree, the pupae are frequently devoured by the ants which respected them or even protected them as larvae. But the *Teratoneura* almost as frequently as not pupates on a leaf with the base of its stalk within an inch of Coccids and ants.

7. *Teratoneura Pupae heavily parasitised by Chalcids.*

Feb. 22, 1917.—I notice that the pupae are heavily parasitised by Chalcids, and I cannot say I have ever seen a parasitised *Hewitsonia* of a good many seen by me now.

March 1, 1917.—I think I remarked on the frequency with which this species is parasitised, a very tiny Chalcid

* "Scaffery" is defined in Murray's Oxford Dictionary as—"Extortion, extortionate taking of perquisites."

and a much larger one being the culprits. [For the species and numbers see p. 459.] I have seen many *Hewitsonia* pupae, old ones on trees besides those I've bred out and let away, and do not remember having got one parasitised. I have been in the way of breeding them out as I found them and letting them away without keeping records, but I intend to look into the question of their parasitism more particularly now. *Hewitsonia* larvae are protected by the ants (unconsciously, for they give no return) and also by their cryptic coloration both as larvae and pupae. The larva of this other species [*Teratoneura*] is brightly coloured. It asks for trouble, but no doubt is partly protected by the ants, as is *Hewitsonia*. As a pupa it has succeeded very well in looking like nothing in particular—a valuable disguise I should think, but it is at this stage that it is attacked. I saw a tiny Chalcid on one, one day.

8. *Other Enemies of Teratoneura.*

Feb. 28, 1917.—Just underneath that passage in Shelford [p. 350] the subject of birds eating butterflies is mentioned. I may say that under these trees I have seen one or two butterfly (the Lycaenid) wings that may have been the remains of a bird meal.

March 1, 1917.—By the way, I saw a large green Mantis with the remains of a larva one day, but it had left the ants and gone on to a leaf to pupate. Of that I feel sure, for, as it happens, the small stump with its suckers is haunted by one or two Mantises, but they do not go on to the stems among the ants. It may be, however, that the imago wings I saw on the ground were the work of a Mantis.

9. *Teratoneura Imagines feeding on Secretions of Ant-attended Coccidae and driving off the Ants.*

Feb. 28, 1917.—I have had further opportunities of studying the butterfly of which I sent you two specimens last mail, the one with the hairy Lymantrid-like larva. I find that the species appears to haunt the tree on which the larvae are found. By the way, it is just beside the place where I found the *Teratoneura* in Lamborn's time (see p. 339). I am wondering whether I can possibly have hit on that form again, for this species appears to specialise (in the adult stage) in Coccid secretions as food. On this point I have one or two observations to send you which may be of interest. One or two points are rather extra-

ordinary, but I have taken great care in the matter and I do think my interpretation of what I saw is fairly reasonable. Let me first explain the conditions. Two trees of the same species (which probably belongs to the Apocynaceae) had grown up together, but, in partially clearing the land, one was cut down to within a foot or two of its base, and the other was left. From the stump of the one cut down a large number of sucker shoots have sprung, the tips of which are just about 6 feet from the ground. The ends of the lateral branches are nearly all being sucked by Coccids, all of which are ant-attended. Both the big tree and the stump are wholly over-run by ants, though their main habitat is in the big tree and in another of the same species about 6 feet away. They do not have a carton nest, but appear to live in holes in dead branches, though this I have yet to verify. There is a constant stream of ants up and down the trunks of both the big tree and the stump too. About a week ago, on Thursday evening, Feb. 22nd, to be exact, I was trying to find out what the larvae might feed on, suspecting the Coccids as their prey, for pupae are very commonly found near them—often indeed on a leaf of the twig they are sucking. Suddenly I noticed one of the butterflies alight on a twig, as I thought, perhaps to oviposit. It remained for a few seconds and then flew off, circling rapidly round the stump, soon to alight again. It lit on a branch with ants and Coccids on it, and I felt sure I was to see what I've not so far been lucky enough to witness—a Lycaenid ovipositing. I suppose my anxiety to see this prevented me "tumbling" to what really was doing. The butterfly lit just at the tip of the branch, the Coccids being about an inch behind that. It proceeded to walk backwards rather slowly and deliberately, the abdomen inclined upwards at a fairly steep angle to the thorax, and the wings opening and closing fairly rapidly—though not by any means nervously or excitedly—and gently beating the twig. The ants retreated backwards, making hardly any resistance at all, though some dodged to the underside of the twig and ran forwards. The butterfly having gone back about three inches then suddenly dropped the abdomen so that it rested on the twig and ran rapidly forward, the tip of the abdomen brushing the twig as it did so. The backward manœuvre was repeated, this time on the underside of the twig, the wings then hanging downwards, the

abdomen flexed as before. I was still waiting for the egg-laying marvel. I thought I was to see it to some purpose, when "she," if that really was the sex, let the abdomen rest on the twig. But Lamborn used to swear that females that really wanted to oviposit and knew that one wanted to know the food-plant, really did that to annoy the onlooker: so I kept on hoping, till "she" suddenly stopped over the Coccids, unrolled a very slender proboscis and proceeded to absorb the secretion so much prized by the ants. Occasionally an ant would venture along, but retreated without attacking. In a short time the butterfly flew away, circled round for a bit and came back to another twig, where the same performance was repeated. By this time I had formed the conclusion that she was deliberately hustling the ants off what they doubtless regard as their own particular prey. What exactly is the "force majeure" to which the ants yield I do not know; the flapping of the wings isn't a very formidable thing, but it seemed to act and the ants did keep their distance. [The movements described and the position of the abdomen suggest strongly that the butterfly produces and fans towards the ants some odour disliked by them.] I tried the effect of interfering with their lawful preserve by "tickling" the Coccids with a thin grass stalk. Soldiers and workers immediately seized it and held it fast enough to let it be suspended in their jaws when I let go. They had all the appearance of being most justly indignant. I saw the butterfly repeat the performance three times. The performers were only about one foot from my eyes and were not the least bit shy. I failed to catch the leading performer. It was one with the light, predominantly red, underwing. Now I know that nearly every twig of the big trees has Coccids and ants on it, for I got a ladder and looked at some of the lower branches. This evening, about 6.15 p.m., from the ground I counted on the nearest branch of one of the big trees eight butterflies, all busy on the ends of twigs.* Yesterday evening I saw several, and with the aid of the ladder satisfied myself that they weren't merely hung up for the night. I won-

* Dec. 24, 1917.—*Teratoneura* nearly always settles on branches well above the ground, and these branches are always scale-infested. I have never seen them alight on low herbaceous plants, or on the ground—and I'm sure I could see a dozen any day I like—rather luxurious entomology, is it not?—C.O.F.

dered if they were night- or dusk-feeders, and have gone down twice at noon to have a look. The Harmattan is on here just now, and it is extremely hot and dry. In such weather *Monomorium* becomes a dreadful nuisance in its search for moisture, and at mid-day most open-country insects are fairly quiet and seek the shade, but this particular Lycaenid appears to be very active just then. They are very rapid fliers and may be seen, some chasing each other round the branches or in the open near the trees, while others occupy tell-tale positions on the twigs. I wonder if this habit of "tapping" Coccids is confined to open-country forms in districts of rigorous dry seasons and scarcity of water. But now I am on dangerous ground. Peradventure I may be numbered in that "vast majority of collectors and field-naturalists [who] are poor philosophers,"* or in that other equally melancholy crowd of "zoologists [who] are sorry failures when it comes to observing the living animal in its natural surroundings."† But I do lay the flattering unction to my soul that I am not a "collector."

10. *Other Lipteninae—Epitolina, Mimacraea—with Habits similar to those of Teratoneura as described in the last Section.* [A few weeks after the observations recorded on pp. 347–350, Farquharson observed and sent the much smaller Liptenine *Epitolina dispar* Kirby, "as a specimen of a Lycaenid with the same (adult) habits as *Teratoneura*." The butterfly bore the following note: "March 15, 1917. Small Lycaenid observed driving away ants from plant-gland, to suck secretion. Habit similar to hairy larva Lycaenid [*Teratoneura*], only probing plant-gland" instead of Coccid secretion.

On Dec. 14, 1917, three *Epitolina dispar* were captured, together with one male *Mimacraea fulvaria* Auriv. "Drinking plant-gland secretion on Coccid-and-ant-infested plant" is the note borne by one *dispar*, and a shortened form of the same by the others. The *Mimacraea* has in addition, "Captured at Ibadan in act of drinking secretion." On hearing that this latter was a Lycaenid Farquharson wrote, April 28, 1918: "I was astonished at the Acraeinae Lycaenid mimic. I would give something to breed it out. I saw several of them at the same place, and it never entered my head that they were Lycaenids at all. I would never doubt mimicry after that."]

* "A Naturalist in Borneo," R. Shelford, London, 1916, p. 207.

† *Ibid.*, p. 208.

B. NOTES ON THE LIFE-HISTORY AND LARVAL AND PUPAL AFFINITIES OF HEWITSONIA, EPITOLA, ERESINA, IRIDOPSIS AND CITRINOPHILA.

[In the following section a number of interesting notes from Farquharson's letters are arranged in order of dates. The material on which the conclusions were built may be inferred from the following list of specimens now in the Hope Department, remembering that Farquharson observed far more than he collected, sometimes, as he tells us, breeding out these butterflies and letting them go. *Iridopsis* and *Citrinophila*, considered in the two succeeding sections, also form part of the material on which the following notes were built. It must be remembered that in the earlier notes "*Hewitsonia*," as used by Farquharson, includes three species of *Epitola*—*hewitsoni*, *miranda* and *honorius*.

Hewitsonia similis Auriv.—Two males bred at Agege, Oct. 9 and Oct 11, 1917. Both larvae and pupae were found in this locality on the bark of *Antiaris africana* Engler—at Moor Plantation on that of *Alstonia*. The pupa-cases were not sent.

Epitola hewitsoni Mab. (Farquharson's "*Hewitsonia*, New Series A.")—One female, somewhat deformed, bred at Agege, Oct. 19, 1917. The pupa was found, Oct. 16, attached to a leaf, probably near the ant-tree *Antiaris*. The pupa-case was not sent.

Epitola miranda Staud. (Farquharson's "*Hewitsonia* B. type.")—Two females both bred Jan. 27, 1918. Both larvae and pupae of this species were found on the bark of *Alstonia*. The pupa-cases were not sent. Lamborn also obtained four examples from the same locality in 1913, and, curiously enough, all are females. The larva of one was found Oct. 26, pupation took place Oct. 28 and emergence Nov. 6. The other three were captured July 10, Oct. 31 (on stem, feeding on Coccid secretion), and Nov. 6 (10.0 a.m. on blade of dead grass). The only male of this species in the Hope Department is from the S.W. of the Victoria Nyanza (Proc. Ent. Soc., 1918, p. xciii). In the British Museum there are 2 ♂ 3 ♀ (3 ex Coll. Staud., 1 ♀ W. Vict. Nyanza, 1 ♀ W. foot Mt. Elgon); at Tring—6 ♂ 1 ♀ (all Sierra Leone); at Witley—2 ♂ (1 Sierra Leone, 1 without locality).

Epitola honorius F.—One female, deformed, bearing the note: "*Hewitsonia* sp. with brown larva, found at Shagamu.

Pupn. about 8.ix.15 while travelling; emerged 19.ix.15." The pupa-case, attached to a piece of bark, was sent (Pl. XII, fig. 16, p. 475) together with 3 larvae in spirit (Pl. XII, fig. 17, p. 475). The larvae were found on an ant-tree and others believed to be the same on a similar ant-tree at Agege.

Epitola conception Suff.—One female with the following note: "Larva found resting prior to pupation, 10.i.17. Pupn. completed next day; emerged 19.ii.17." The larva was found on the bark of *Alstonia*. The pupa-case was sent, but one of Lamborn's is shown on Pl. XII, fig. 13.

Eresina corynetes Gr.-Sm.—One female found on the bark of *Alstonia*, Jan. 17, 1918. Referred to in a letter of Jan. 26, 1918:—"The small Lycaenid—captured—from the *Hewitsonia* tree. I took it because it was slightly malformed. I have an idea that it had not long emerged, but couldn't find a pupa-case."—E.B.P.]

July 26, 1915.—The mail as I said came on Sunday, and I had one from Lamborn too. I always go out into the bush on Sunday if it doesn't rain, and that day was no exception. I always visit the Lycaenid trees here. Lamborn told me to look out for a *Hewitsonia* larva, and I have in spirit here what I believe to be one.

Sept. 28, 1915.—I now know the larvae of *Hewitsonia*, but haven't yet solved their food problem. But in my three weeks' trek I saw them on every ant-tree I met. The larvae run about among the ants, which do not touch them. I will send specimens next mail if I get a chance.

I also got larvae of identical form [*Epitola honorius*] but of dark brown colour on an (*Cremastogaster*) ant-tree, but of seven only one pupated and the imago is deformed. I found the larvae in forest at a town called Shagamu, which is about two or three days' trek (about 50 miles) from Epe (N.W.): I've not seen them here.

The pupa of the one here at Ibadan [*Hewitsonia similis*], if pupation takes place on a green plant, is coloured more dominantly green than those that go up on bark. I'll write them up more fully, however, later. At present I haven't the time. On the larval feet (pro-legs) are what appear to be glands. I have seen them crawling over a glass lid. They may be found on other larvae of Lepidoptera. They do not appear to secrete. They are on the outer side of the foot, rather like this. [Sketch in letter. See pp. 342, 355, 383, 485.] I think the part is retractile. I think

they are lichen-feeders, but I intend to examine the frass. They won't feed in captivity.

The *Hewitsonia* larvae, by the way, are in no sense ant-attended. They keep in the track of the ants and rest in crevices in the bark quite near the nest. The ants do not heed them. I think they are protected by their hairs and bristles. The ants unwittingly protect them from other foes.

Nov. 24, 1915.—I was so astonished at the Shagamu, one being an *Epitola* [*honorius*]. The larva in form is exactly the same as that of the *Hewitsonia*; only the brown colour is different. They look more like moth larvae. I send you one or two which are unfortunately not normal in size and aspect. I found seven at Shagamu which looked as if they might be about ready for pupation, so I put them in tins with fixed bits of bark for transport as I had to keep travelling, but only one pupated. The rest tried and failed, so that they are little more than skins. I am to send next mail one or two good *Hewitsonia* larvae [not received] and you will be better able to judge their characters; so far as I can make out Lamborn never saw the *Epitola* [*honorius*] larvae.

The *Hewitsonia* larvae are never attacked on the tree, but in a small tube where free movement was prevented, one of several enclosed ants got in between the hairs and proceeded to bite the larva to its great distress. I think they are night-feeders, for in the daytime they are quite passive.

I am so curious to hear what the relationships of the *Hewitsonias* and *Epitolas* are. The Shagamu *Epitola*, with its brown larva, in its larval stage is as like to a *Hewitsonia* larva in characters, down to the foot "gland," as any two larvae with different colours can be. They are not like any other larvae I know. As a further point I may mention that several *Hewitsonia* larvae exactly the same in colour as these here, occurred on the same tree with the *Epitola* brown ones at Shagamu. I got some of the ants, but they moulded extremely badly and got destroyed, but the ant is almost certainly the same as the one on the tree here—a small *Cremastogaster*. On a tree at another place on the same trek I saw a *Hewitsonia* larva on a tree associated with a *Cremastogaster* of about the same size, but with a reddish-brown abdomen. [The ant is probably *Crem. buchneri* Forel, r. *clariventris* Forel,

found associated with the larvae of *Lycaenesthes* sp. ? *alberta* Beth.-Baker by W. A. Lamborn. Trans. Ent. Soc., 1913, p. 476.]

Feb. 26, 1916.—*Hewitsonia* larvae are not to be found now. However, we've had the first tornado of the year and the rains are about to resume.

Government Farm, Agege.

Dec. 15, 1916.—I am almost positive that, on a tree nearby that bears a large *Cremastogaster* carton nest, a few larvae (young ones) crawling thereon are those of the *Epitola* I found in Shagamu last tour [*honorius*], which mimics, I think, *Planema epaca*. I'll try to farm out the rubber business till one or two mature. They are mixed with *Hewitsonia* ones and possibly an *Iridopsis*. I will send you some frass for microscopic examination as soon as I can. But what a pity that I get so little time in high forest districts, for it's there that the carton nests abound, and I'm positive that I could do a lot to clear up a number of very interesting life-histories. I will do what I can here, but the whole place has been cleared to make cocoa farms, and nests are few and far between.

Moor Plantation.

Feb. 22, 1917.—I have been long in following up my last letter for two reasons, first because I did not have any luck at all with the *Epitola honorius* at Agege. . . . I got one larva to pupate and lost it, the ant *Monomorium* being responsible. I had watched daily several larvae that were coming on nicely, but they always disappeared and I failed absolutely to find the pupae. I'm not sure that they succeeded in pupating. I saw several new broods, but either they went too high up the tree or they were destroyed by some enemy.

I did find one enemy which I am sending by to-day's mail. I saw it actually attack a medium-sized larva and kill it. To do so—it is a Reduviid bug [*Sphedanolestes* sp., with the note "Agege, Dec. 17, 1916. Reduviid preying on Lycaenid larva"]—it had to dodge about among the ants, but it managed that all right. I hope to get back to Agege in the wet season and may remain there a month, when I hope to do something.

I think the tree on which the larvae are found is the same kind as the one (in the Gambari district, about

24 miles south of this) on which I got the curious little Diptera last tour [p. 444]. You may recall my description of their curious larvae, which wandered about freely among the ants. I did not find them, however, at Agege. I do not know the species of tree, but it is habitually inhabited by ants, and always carries large carton nests.

[The following note in the same letter refers to *Epitola conception* Suff.] I have also sent you another little Lycaenid with a very *Hewitsonia*-like pupa-case. I bred it out from a larva (a hairy moth-like larva too) which I found about to pupate on Lamborn's old *Hewitsonia* tree [*Alstonia*].

March 18, 1917.—I must say the *Epitola honorius* pupa-case more closely resembled the *Hewitsonia* than either of them resembles the *Teratoneura* and yet the poise of both is not unlike, though the two former have a much broader attachment than the latter. In fact, I think that except for the colour of the pupa (and in *Hewitsonia* at least it varies a little to harmonise with the background) which is rather darker in *Epitola*, I should find it hard to tell one from the other.

All the larvae have the little protrusible process on the outer side of the pro-legs (one spirit specimen of *Teratoneura* shows these exerted), but so also have the *Pterocarpus* larvae [*Lycaeninae*, see pp. 383, 485, &c.].

Agege.

Oct. 18, 1917.—I have also sent two *Argiolaus* and two *Hewitsonia* from a tree here in Agege on which I got the very tiny Lycaenid of which I told you last mail, which duly emerged. I am waiting for a large mail steamer to carry it home. The tree is a tall buttressed one of the Apocynaceae family, I think [it is the Moraceous *Antiaris africana*], but all round the base I found fallen *Loranthus* corollas of a different species from the one on which I got the Lycaenids at Ibadan. There is, of course, a *Cremastogaster* nest rather beyond my reach. I took in the *Hewitsonia* pupae for a special reason. I was to put you a query about them and found you had put it to me in slightly different form. Of that I will say more. I, as a matter of fact, was to suggest that the *Hewitsonia* larva was rather variable, and was to promise to look into the question closely.

Moor Plantation.

Dec. 24, 1917.—I went down again in the afternoon (Sunday) of these great events [Dec. 23. See Proc. Ent. Soc., 1918, p. xxxii-xxxv]. It is worth something in the conditions in which I have to work at present, to know that at almost any spare moment in daytime I can go down feeling tolerably certain that if I choose I can see such things as *Teratoneura* larvae, just for the trouble of going to the particular tree, or *Hewitsonia*, or—a great many other things. As I was looking out for opportunities for catching the myrmecophilous Diptera on the stem of the *Funtumia*, a *Hewitsonia* actually came along (it was then about 3.30 p.m.) and laid two tiny ova in the track of the ants. It was done with such rapidity that I had difficulty in locating the tiny ova, and the ants didn't seem to suspect their presence either, or, if they did, took no notice. The ova were pale yellow in colour. It is extremely unusual to see *Hewitsonia* on the wing. I have often wondered if they are night-fliers, though it may be that they fly around tree-tops.

Jan. 26, 1918.—By the way in the proof of the Lycaenid notes you refer to "the genus to which *Epitola honorius* belongs." * From the larvae I would have sworn they were Hewitsonias, adapted in colour to the brown bark of the tree on which I found them. They were as alike and more so than the *Loranthus*-eating larvae of *Argiolaus*.

Feb. 8, 1918.—Mail day. The box I have sent is not so interesting nor so complete as I'd have liked. I have mislaid the pupa-case of the *Hewitsonia* [*Epitola hewitsoni*], which is characteristic in not lying along the bark of the tree with its long axis parallel to the tree surface, but sticks out at about 70° in a very odd position. I will be able to write more fully on the point later.

Feb. 14, 1918.—The big crumpled one that went by the same mail is one of the "*Hewitsonia*" series. When I said there were three species [*Hewitsonia similis*, *Epitola hewitsoni* and *E. miranda*] I was thinking more of the similarity of larvae, which is quite as close as that between the various *Argiolaus* larvae in shape. Only in the case of *E. hewitsoni* the pupa-case projects outwards at an angle from the substratum on which the pupa rests. The B series of "*Hewitsonia*" [*Epitola miranda*] which is

* In the British Museum this species was assigned to a distinct, undescribed genus.

on the way home also has a projecting pupa, but the third one's [*Hewitsonia similis*] pupa lies along the surface of the substratum. But their larvae and that of *E. honorius* are extremely similar in form, only differing in colour. I am trying to get a carefully differentiated series to clear up the whole thing. I have only seen about 3 species of *Charaxes* larvae. They are all of the same shape and not like any others I know. *Argiolaus* larvae are nearly as alike in some ways, but the *Hewitsonia* or *Epitola* larvae are as unmistakably related by form and habit as *Charaxes* larvae. I thought for a time that the changes in colour were cryptic changes of one form. *Teratoneura* is a little different. *Iridopsis* is nearer, but the larva has the distinctive habit of spinning a silk protection before pupating. You will notice too the likeness of the *Citrinophila* pupa-case to the *Hewitsonia* and *Iridopsis* types. If only I had time and a forest district to work in I could do them all up. When the Director comes back I think I'll try to get a local holiday to a forest district. I know exactly where to look for these things, and I've only to get into a decent district to get lots more of other species. I think I'll have earned a holiday, for I've been nearly 17 months out now without anything but the statutory days—Xmas, Bank, Empire, New Year, and it isn't much. At times I don't feel any too willing to get up early in the morning, and I lose more sleep than I like to. Still one must make the best of things. This is an extra mail, sprung on us on two days' notice, so I won't have time to write more.

C. THE LIFE-HISTORY OF IRIDOPSIS INCREDIBILIS
STAUD.

[The following notes refer to a male and female *I. incredibilis*, which emerged on Sept. 30 and Nov. 6, 1915, respectively, the pupae having been found on the bark of *Alstonia* a few days earlier. Both pupa-cases were received.]

Nov. 24, 1915.—I also got off two little Lycaenids which I do hope will reach you all right, as I have a feeling that even two (if they arrive in good order) will be, at least in a small way, a Xmas contribution that will interest you. I know the larva, but have not yet got one in spirit. It also comes from the *Hewitsonia*, *Argiolaus maesa*, and *A. alcibiades* tree [*Alstonia congensis*] that Dr. Lamborn

loved here on Moor Plantation. I feel sure they also are relations of *Hewitsonia*. Their larvae are of the same general hairy character and like the others run about in the vicinity of the ant-nest, over the bark of the tree. I am not yet certain what they feed on. I think it must be Algae or dead bark. They have no dorsal glands, and are disregarded by the ants though they run about in their tracks. I think it is an association of mutual respect. The Lycaenid larvae are protected passively, so to speak, by the ants. No other insects that would be likely to harm them will venture near them for fear of the ants. It is not a beneficial partnership (nor yet the reverse), for, as I say, the ants simply ignore them, seeming unable to attack them on the tree.

Feb. 26, 1916.—The *Iridopsis* larva which I once saw was on the *Hewitsonia*-tree here [at Moor Plantation]. I've wondered uneasily several times whether I hadn't misplaced the imago among the Lycaenids, for the brown chitinous-looking pupa-case, distinct and separable from the cast skin which completely envelopes it, is very moth-like. Further the larva spins a fairly dense web of white silk to form a little cage in which I found the pupa in each case. It selects a fairly deep narrow crack or pit in the bark of the tree for the purpose, in a manner recalling the habit of some spiders. I feel sure I'll be able to get more on my return next tour—if the Huns do not get us going or coming by sea. The larva has a denser protection of hairs than the *Hewitsonias*, but shorter, and they are not quite so active. In shape they rather differ, and as to the process on the pro-legs which I saw in *Hewitsonia* and the *honorius*, I'm not sure in this case.

Agege.

Dec. 15, 1916.—On the way down here [Agege] I stayed two days at Olokemeji, the Forestry headquarters. On an *Albizzia lebbek* Benth., with quite a number of *Iridopsis* empty pupa-cases on it, there was a *Crematogaster* nest similar to the one seen at Agege (p. 354).

[The following paragraph refers to a male *Iridopsis incredibilis* found about Dec. 7, 1916, on the bark of the Leguminous tree mentioned above.]

Moor Plantation.

Feb. 22, 1917.—The name of the tree—"Lebbek"—is a corruption, I think, of an Egyptian name. It is not

native here, but is used as a shade tree. I got a butterfly on it just emerged, which may be an *Iridopsis*.

[The butterfly referred to below is a female *I. incredibilis*, with the pupa-case in its silk-covered depression in the bark. They bear the date of emergence, Jan. 14, and the notes "Larva hairy and predominantly red" and "pupa in shallow depression in bark—silk-covered." There is little doubt that the tree was *Alstonia*.]

Jan. 12, 1918.—I have a Liptenine pupa just now which I found as a pupating larva not long ago—the pupa not unlike a *Teratoneura*, but the larva was different and "went up" in a depression on the bark of the tree after weaving a silk defence like an *Iridopsis*. The silk was finished before I met the larva and I couldn't disturb it, but the predominant colour was red, and I do not think I have seen it before. [Jan. 26.—"It is a fine big *Iridopsis*."—C.O.F.]

Feb. 8, 1918.—I send the *Iridopsis* and its pupa-case—it is the one I told you of that had the larva with a lot of red. *Iridopsis* has one curious character: it generally pupates in a niche in the bark of the tree, but first spins a web of silk so as to shut itself in as some spiders do.

Aug. 25, 1918.—[After referring to various Diptera and to larvae of Endomychid beetles, etc., haunting the "ant-tree" (*Alstonia*) at Moor Plantation the letter continues.] There were also one or two young *Hewitsonia* larvae, and I saw an *Iridopsis* come and oviposit. This must sound rather a tall yarn, all these things on one day, but such are the facts.

D. NOTES ON THE PUPATION AND LIFE-HISTORY OF *CITRINOPHILA TENERA* KIRBY.

[The single specimen sent by Farquharson is a male. It is accompanied by its pupa-case still attached to the bark of the Pará Rubber tree, *Hevea brasiliensis* Müll. Arg. (Euphorbiaceae). It bears the note "Lycaenid found newly emerged on Pará tree, Agege. Pupa-case found also. 18.x.17."]

Agege.

Oct. 18, 1917.—This forenoon as I was examining tapped surfaces of Pará trees in connection with a really difficult disease problem that I think I may manage to solve, without the aid of a fungus (or, of course, an insect),

I saw a newly emerged Lycaenid, a bright yellow one with black-tipped wings. And just beside it was its empty pupa-case! Nowhere round it was a plant of any sort except rubber, the shade being too dense for weeds, and I feel sure he is of the bark-feeders. I won't send it this mail, for surely such a load would be too much for the old boat. Nor is this an end to the wonders that Lamborn enabled me to see—how I wish he were here! [Oct. 20.—“The pupa-case is remarkably spiny.”—C.O.F.]

Moor Plantation.

Feb. 6, 1918.—There is a shady little place by the river where every day, if I care, I can see a half-dozen of the little yellow and black forms. They are always fluttering round a huge tree with a promising-looking bark, but few ants except *Pheidole*. I feel certain every time I see them that their life-history is about six feet away, but I've had no luck so far. Lycaenids in my limited experience are never far from their breeding-place, but the trouble is to find it. Some of them, of course, may oviposit on the tops of high trees.

II. LYCAENINAE.

A. NOTES ON THE LIFE-HISTORIES OF NINE SPECIES OF IOLAUS (TANUETHEIRA, ARGIOLAUS AND EPAMERA) WITH LARVAE FEEDING ON THE FLOWERS OF LORANTHUS INCANUS SCHUM. AND THONN.

[Farquharson's interesting notes are illustrated by the following fine series of bred specimens, with many of the pupa-cases from which they emerged, and some of their larvae sent in spirit. The larvae and many of the pupae, reconstructed from their cases, have been described and figured by Dr. Eltringham in the Appendix (pp. 473-89). The pupa-cases sent by W. A. Lamborn were substituted for Farquharson's in two of the species, and in addition to the West Coast pupae, that of an East African *Argiolaus*, collected by Lamborn and the Rev. K. St. Aubyn Rogers, is described and figured (Pl. XIII, fig. 1; pp. 480-81). Dr. Eltringham also comments on the Guenée gland, the "electric" sensation produced by these larvae, etc. (pp. 484-85). For a brief preliminary statement of the

facts recorded in this section see Proc. Ent. Soc., 1917, p. lxi; 1918, p. lxxix; for Farquharson's observations on ants attendant on larvae of *Myrina*, Proc., 1914, pp. xxiii, xxiv.

1. *Tanuetheira timon* F. (Farquharson's A).—2 ♂ 2 ♀, emerging between Dec. 14, 1917, and Feb. 10, 1918; accompanied by 3 pupa-cases, one noted as that of the first butterfly to emerge, a ♂. The dull green larvae on flowers of *Loranthus incanus* parasitic on sparsely *Pheidole*-haunted *Funtumia elastica* Stapf (Apocynaceae). A larva sent in spirit is figured by Dr. Eltringham together with one of the pupae (Pl. XIII, figs. 5, 7, 11; pp. 478-79).

2. *Argiolaus alcibiades* Kirby (Farquharson's G and "Gall affinis").—5 ♂ 2 ♀, emerging from about August, 1915, to Jan. 24, 1918: 3 ♂ 1 ♀ are accompanied by their precise pupa-cases. Larvae on flowers of *L. incanus*, on *Cremastogaster*-haunted *Alstonia congensis* Engl. (Apocynaceae), never on the same *Loranthus* on *Funtumia*. Most of the specimens bred from pupae found on shrubs beneath the *Alstonia*. One ♀ was bred Oct. 4, 1917, at Moor Plantation, from a larva found at Agege on the flowers of an allied species of *Loranthus*, on the *Cremastogaster*-haunted *Antiaris africana* Engl. (Moraceae). The pupa of a female (Jan. 23, 1918) is figured by Dr. Eltringham (Pl. XIII, fig. 2; p. 480). Lamborn also bred this species from a pupa attached to the leaf of a climber on a tree bearing a huge nest of *Cremastogaster buchneri* (Trans. Ent. Soc., 1913, p. 474).

3. *Argiolaus panepinata* H. H. Druce (Farquharson's B).—7 ♂ 12 ♀, emerging between March 4, 1917, and Feb. 4, 1918: 2 ♂ 4 ♀ accompanied by precise pupa-cases: one ♀ emerged about 8.0 a.m.: one ♀ emerging Jan. 8, 1918, pupated Dec. 29, 1917. In addition to these 19 specimens, a dwarfed ♂, emerging Feb. 9, 1918, and sent as D (*Epamera iasis*), probably belongs to this species. The blue colour resembles that of the ♀ rather than the ♂ *panepinata*, a possible result of unfavourable conditions. It is certainly not *E. iasis*. All the larvae on flowers of *L. incanus* on *Funtumia elastica*, at Moor Plantation, but 2 ♂ emerged at Agege (Oct. 22 and 23, 1917). This, the commonest larva, feeds when the flowers are immature, and exactly resembles their "dull green—a sort of bud-scale green shot with brownish hairs." The larva is figured (Pl. XIII, figs. 9, 18; pp. 479-80).

4. *Argioloa iulus* Hew. (Farquharson's F).—2 ♂, emerging Feb. 25, 1917, and Jan. 23, 1918. Each is accompanied by its pupa-case (Farquharson's "decorated pupa"). Both larvae were from *L. incanus* on *Alstonia*, although Farquharson specially notes on the label of the 1918 ♂ that he had bred it before from the same *Loranthus* on *Funtumia*. The 1917 pupa is figured (Pl. XIII, fig. 4; p. 480). This species was also bred by Lamborn from larvae on a parasitic climbing plant. He notes that they had a dorsal gland and were attended by a race of *Cre mastogaster buchneri* (Trans. Ent. Soc., 1913, pp. 474-5).

5. *Argioloa maesa* Hew. (Farquharson's H and "Gall").—4 ♂ 1 ♀, emerging Aug. 14-24, 1915: all with precise pupa-cases. Larvae on flowers of *L. incanus* on *Alstonia*, never on the same *Loranthus* on *Funtumia*. The larva is also found on an allied *Loranthus* on *Antiaris* at Agege. The figured pupa is an ichneumonid one which has kept its shape better than an empty case. It was collected by Lamborn at Moor Plantation (Pl. XIII, fig. 17; p. 481).

6. *Epamera laon* Hew. (Farquharson's E).—1 ♂: pupation Jan. 16, emergence Jan. 31, 1918. Mole-coloured larva on flowers of *L. incanus* on *Funtumia*. A ♂ pupa collected by Lamborn at Oni, 70 miles E. of Lagos, is figured (Pl. XIII, fig. 15; p. 481). The characteristic position of this pupa, across the stem, was noted on the specimen by Lamborn, Feb. 18, 1912.

7. *Epamera iasis* Hew. (Farquharson's D).—5 ♂ 7 ♀, emerging Jan. 11-Feb. 11, 1918. The ♀ of Jan. 11 is accompanied by its pupa-case, which, although somewhat flattened by the packing, still shows its position across the stem of *Loranthus*, near to a "cushion" (p. 368) which it resembles. All the larvae were on flowers of *L. incanus* on *Funtumia*. This larva replaces the commonest, *A. panepinata*, and becomes itself the most abundant when the flowers mature and open. They are pink or red when young and may become yellow or yellow-orange later on, thus matching the changing colour of the flower.

The last consignment of *E. iasis* included a dwarfed ♂ probably of *A. panepinata* (p. 361) and 2 ♂ of *E. mirabilis* (p. 363).

8. *Epamera farquharsoni* B.-B. (Farquharson's C).—2 ♂ 7 ♀, emerging Jan. 9-14, 1918, the first 6 being ♀. The first ♂ and seventh ♀, of Jan. 13, emerged about 2 p.m. The pupa-cases are of much interest. The ♀ of

Jan. 9 is accompanied by 2 cases to which the same number (C 1) had been accidentally fixed. Each is attached to a stem of *L. incanus* and lies across it in the usual *Epamera* position. A female of Jan. 11 (the ♀ type) and of Jan. 13 are accompanied by their respective cases fixed to the bark of the *Funtumia*. They are extremely well concealed and probably possess the power of individual colour adjustment. The pupa-case of the ♂ (type), Jan. 14, is also fixed to the bark, but close to a prominent ridge which probably supplied the same stimulus as a thin stem; for the pupa lies across it at an angle of 45°. Finally, a pupa-case, found empty on a *Loranthus* stem, lies across it just above a "cushion." This is the specimen figured by Dr. Eltringham (Pl. XIII, fig. 10; p. 482). For the larvae see Pl. XIII, figs. 6, 12; p. 482. As implied above the larvae were always found on flowers of *L. incanus* on *Funtumia*. They are the caterpillars with the extraordinary resemblance to the flowering cushions which surprised and delighted Farquharson.

Farquharson devised an excellent method for sending these pupae in their natural surroundings. A thick piece of bark with the pupa in the centre was cut out, probably with a chisel, and pressed into a thick bed of glue at the bottom of a stout cardboard box. When it arrived, I cut through the glue round the edges of the bark, with a fine-toothed saw, leaving that beneath as a flat base on which the specimen rests in the drawer. The bark and glue were carefully drilled in two places for pins to prevent shifting. Thus all moisture was avoided and the bark with its Cryptogamic growths remains quite unchanged.

For Mr. G. T. Bethune-Baker's description of this species see pp. 462-63.

9. *Epamera mirabilis* H. H. Druce (labelled D by Farquharson).—2 ♂, emerging Feb. 12, 1918, both from the *Funtumia* mistletoe. The specimens were compared with the unique type from Sierra Leone (now in the possession of Mr. J. J. Joicey), and Mr. H. H. Druce agreed that there was no doubt about their specific identity. The ♀ unfortunately still remains unknown; Mr. Druce's conclusion that *mirabilis* is allied to *iasis* is supported by Farquharson's employment of the same letter D for both forms, showing that he did not distinguish them in the earlier stages.

Mr. Druce has informed me that the figure of *mirabilis*

in Trans. Ent. Soc. Lond., 1907, Pl. II, fig. 8, represents only a single hind-wing tail—the central one—although the type possesses all three. In the text (p. 81) and also in the original description (Ann. Mag. N.H. (Ser. 7), vol. xi, 1903, p. 71) there is an inadvertent error in the statement that the insect lacks the row of hairs on the inner margin of the hind-wing under surface. The fore-wing is, of course, intended. The absence of the patch of special scales on the shining area of the hind-wing upper surface where it is overlapped by the fore-wing, and of the hairs on the fore-wing under surface by which, in other species of the genus, these scales are covered, is emphasised by the name *mirabilis*, and leads the author to remark that the species “seems to open up the question very forcibly as to whether distinctive genera can be made on the absence or presence of these ‘sexual marks.’ It appears to agree in venation exactly with *Epamera*.”—E.B.P.]

[In the following extracts from Farquharson's letters the species referred to are indicated in square brackets.]

July 26, 1915.—I got to Lycaenid tree No. 1 [*Alstonia congensis* Engl.] from which the Hewitsonias are obtained, and was looking intently at the bark from different angles. I got nothing on the tree at that time and passed on to the next one. Here Lamborn found that extraordinary gall-like pupa [*Argiolaus maesa* Hew.]. I had the great luck to get a larva which has since pupated. I also found on a small shrub at the base of the tree a pupa of another species [*Argiolaus alcibiades* Kirby]. I can hardly hope that it is one Lamborn didn't get. It was on a leaf. Its shape, with the broad tail attachment, in general resembled the other, but it is not really gall-like. Unfortunately at the head end which appeared to rest on the leaf, there appeared to have been a slight exudation of the living matter. The pupa was a dull olive-green colour. I took it in, however, in hopes that it might not be irretrievably damaged. Yesterday a wretched Ichneumon emerged. But just in case Lamborn didn't get it, I went back yesterday and on another little group of shrubs, hardly more than seedlings, I actually got two healthy-looking pupae, of an apple or Alga green—not shining but dull green like the surface of a tomentose leaf. There had been a third one which had got damaged and was being eaten by little

Cremastogasters off the ant-tree. But the two are safe, and if an Ichneumon comes out I'll be very angry indeed. I went back yesterday evening, and, as the place is rather shady and it was getting dusk, I failed to notice that the ground was simply alive with black drivers before I had quite half a dozen biting like fury under my nether garments and a lot more running up the outside. It was lucky I got the pupae in the morning or they'd have been eaten up that night. There's nothing succeeds like success, and I went there this evening and got another "gall" larva. I was actually expecting to find the larva of the other, and I may do so before long.

July 29, 1915.—The pupa of *A. alcibiades*, though not striking, is in a general way, in its "pose," rather like the gall one [*A. maesa*].

Sept. 28, 1915.—The *alcibiades* larvae do not feed on beans. They come down the ant-tree—Dr. Lamborn's "*Hewitsonia*-tree," a species of *Alstonia* [*congensis*], haunted by *Cremastogaster* ants—just as *maesa* does. They have, I think, a Guenée gland. I've got one in spirit. They have no tubercles.

Feb. 22, 1917.—I think I have two new *Argiolaus* pupae [*A. iulus* of which a ♂, emerging Feb. 25, 1917, was received]. One has just emerged, but it is too soft to kill as yet. I think the *Argiolaus* lives on a *Loranthus* parasitic on the same tree as the *Hewitsonias*, but I think its food may be a scale on the *Loranthus*. [This paragraph may have been written a few days later than the beginning of the letter.]

Feb. 27, 1917.—Before reaching it [the *Pterocarpus*, p. 382] I had to pass a tree where *Hewitsonia* pupae are at times to be found, and soon found three. For a special reason I examined one or two small shrubs of the undergrowth for other Lycaenid pupae, the special reason being the presence on the large *Hewitsonia*-tree (I do not know the species [*Alstonia congensis*], but believe it to belong to the family Apocynaceae), of two or three large *Loranthus* parasites, which I now believe to be the special habitat of the two species of *Argiolaus* [*A. alcibiades* and *maesa*] which I sent last tour and of the other sent last mail [*A. iulus*]. The larvae (not invariably but frequently) leave the ant-infested *Loranthus* to pupate, often travelling a long distance—60 ft. at least in some cases—to pass the critical, because vulnerable, stage between the larval and

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the completed pupal condition. I found two empty pupa-cases of the *Argiolaus* type and passed on to my *Pterocarpus* which was growing near by. Just under it I noticed another empty Lycaenid pupa-case, again of the *Argiolaus* type, which may indeed have come from the *Hewitsonia*-tree.

May 18, 1917.—Did I mention that I believed that the *Argiolaus* were probably somehow connected with a parasitic *Loranthus*? I am now in a position to say that they feed on the *Loranthus* flowers. I will tell you all about it next mail.

Agege.

Oct. 18, 1917.—Just before leaving Ibadan I noticed my *Loranthus* coming into flower. I think it flowers twice a year at least. I thought I'd look for some apparently fully fed larvae, for there's one form I failed to breed. Both the pupae I got were unaccountably spoilt. I found incidentally a large proportion of the flowers galled by a Psyllid, I think. Last time of flowering the flowers were normal. I got two Lycaenid pupae and several larvae [of *A. panepetrata*]. That was on Friday the 12th inst. As bad luck would have it, I had no excuse left by which to avoid dining out and couldn't get near them on Saturday evening. The day was a busy one and any work on them then impossible. On Sunday I was rather out of sorts (a suspicious circumstance, but really unconnected with the unfortunate dinner) and in addition had to do some wretched packing up, as also on Monday. All this sounds most neglectful and I grieve to have to admit it, for last night I discovered what I had missed. The larvae had all pupated except one, which was manifestly dead. But in the bottom of the box (a glass-lidded tin of the ordinary kind) were several curious white threads, a ghastly, horrid Nematode I take them to be. There were I think five, two nearly as many inches long. If there is any class of animal on this earth that I loathe, hate and detest it is the Nematode. Snakes are, compared with them, a theme for poets. Perhaps after all it is a case of *ignotum pro horrifico*. Anyhow, they're in a tube with spirit and you'll get them in due course. There was absolutely nothing else in the box from which such huge things could have come unless they lived in the *Loranthus* flowers. Looking at their semi-opaque bodies with a lens, they have almost an annulate appearance and I will not

guarantee their classification. They are unpigmented and look like Nematodes. That is enough for me! If I've labelled them it is their own fault. Men have told me that our common large Mantis frequently harbours a very long round worm, but I've never seen one. What I marvel at is their rate of growth, if these worms really did come from the Lycaenid larva. It must have been very rapid.

Port Harcourt.

Nov. 15, 1917.—My friend Dr. Connal, Director of the Medical Research Institute at Yaba near Lagos, examined the Nematodes that I believe to have come from the Lycaenid larva. He thinks they are Filariidae, but all the specimens were females and he would not venture on a nearer diagnosis.

[I submitted the Nematodes to Dr. H. A. Baylis of the Natural History Museum, who could not say more than that they were immature Mermithidae. Dr. Baylis' remarks may induce naturalists to help on the study of this parasitic group :—

“ I have looked at the Nematodes from the Lycaenid larva, and am sorry to say that, as I feared, their characters are purely larval, though they are of such a large size. I am afraid, therefore, it is quite impossible for me to attempt to name them. The species to which the Mermithids found in Lepidoptera are most commonly referred (at least in Europe) is *Mermis albicans* v. Sieb., but I suspect that this is a conglomeration of species, which in their larval state it is impossible to separate at present. People should try to keep these worms alive for a time after their emergence from the insects, in order to give them time to mature. . . . I should be very glad if you would let me have any such living larvæ of *Mermis* that you happen to come across. Feb. 24, 1920.”]

Moor Plantation.

Dec. 24, 1917.—Now for this evening's adventures. I started (perforce) rather late and had very little daylight left, too little for the flies and mosquitoes, but of course I know that if I choose—and I probably shall—I'll get some more to-morrow. But I had noticed a day or so before that my *Loranthus* was exhibiting flower-buds, and I thought it was about time I had seen to it. Now these flowers are, when mature, long, tubular, yellow (a sort of *Potentilla tormentilla* yellow, but with a “ matt ” surface) things with

red tips, the red being exactly that of a good old-fashioned Bryant and May match. The flower, in fact, has a by no means fanciful resemblance to a "Swan" vesta with a yellow stick. When mature the most abundant Lycaenid on them is one with a pink larva just delicately tinged with yellow and extremely difficult to see unless one knows how to detect them. [It is evident from a later letter, p. 372, that the larva is *E. iasis*; but the commonest species was ultimately found to be *A. paneperata*.] I am to send you a new series of these when they come on, for the *Loranthus* series threatens to be more complex than the *Pterocarpus* one [p. 381]. That tree, too, may soon be coming into flower. This evening's adventure has seriously complicated the *Loranthus* series. The *Loranthus* flowers are verticillate. They arise apparently, season after season, on the same "cushions," to use a term applied to cocoa-flowering. These cushions are rough and warty, brown in colour, tinged here and there with dull green. Arising on them and sticking upwards are found the flowers; at the present stage these are dull green—a sort of bud-scale green shot with brownish hairs. There is no trace of the red tip yet. I was not surprised to find the larva of the form from which I bred the Nematodes [*A. paneperata*]. It is exactly that colour. I expect to get a few and to be able to send one in spirit. I had taken my knife to cut off a "cushion" with its partially developed flowers when my eye caught sight of something that ought to have been a part of the cushion but was—another larva, a perfectly amazing cryptic form with curious knobs and an astonishing and quite indescribable medley of colours, a masterpiece of camouflage! [The larva of *E. farquharsoni*.] I got him safely into my tin and proceeded to cut off the cushion of flowers for it to "chop." Camouflage can have its disadvantages. Alas, I cut another one in two and my joy at finding No. 1 was seriously damped. But before it was too dark I got four in all. I'll get more, I'm sure, and I'll have one to spare for spirit. I'm positive, however, that I didn't overlook these before, when the flowers were in full bloom and the predominant colours were yellow and red. And the pink larva form [*E. iasis*] hasn't arrived yet. The colours [of *E. farquharsoni*] aren't bright nor are they many, but the few there are, green, brown and tiny hints of red, very very slight, are wonderfully blended. The *Argiolaus maesa* has a very odd

larva and is slightly reminiscent of this one, but it is much less "knobby." Altogether to-night I think I have three different *Loranthus* forms and the pink one [*E. iasis*] is not included. All are wonderfully cryptic in their own way. What an astonishing piece of good fortune that a *Loranthus* should have grown on a *Funtumia* branch about ten feet from the ground. I just mount a step-ladder and pick them off in comfort. Curiously enough there are few ants on the trees and one of the forms has glands and tubercles (not the one, the camouflage expert). None were actually attended.

Dec. 27, 1917.—An odd thing struck me this evening. I have got, I think, four different larvae on the *Funtumia-Loranthus*. The tree with its parasite is not 30 yards from the *Cremastogaster-Hewitsonia-Argiolaus maesa*-tree, and yet I have never found *A. maesa* on the *Funtumia*, nor the other very large (the largest of all) *Argiolaus alcibiades* that is also found on the ant-tree. Yet I am sure they both feed on the same species of *Loranthus* that is also parasitic on the ant-tree. But it is not a *Funtumia*, though I think it is also Apocynaceous. [It was the Apocynaceous *Alstonia congensis* Engler.] It is much taller, three times as tall, and it may be that the species that oviposit there fly high. Yet it is odd that *maesa* and *alcibiades* are not found on the *Funtumia-Loranthus*, and it suddenly came into my mind this evening that the *Loranthus*-“aura,” as it were, may vary according to its host, so that the chemotropic stimulus that impels a butterfly to oviposit in the one case is absent in the other. Of course it may be due to the absence of the *Cremastogasters*. The *Funtumia-Loranthus* is sparsely ant-tenanted, but a few *Pheidole* sp. being present, it would appear that the Lycaenid species do select particular ants. I have never found the *Funtumia* series pupae anywhere near the other tree. The *maesa* larva when it descends for pupation is always accompanied by ants, which it has difficulty in getting rid of in order to pupate in safety.

Dec. 29, 1917.—Two of the new Lycaenids [*E. farquharsoni*] have “gone up.” The pupa is as cryptically coloured as the larva. The two pupae are somewhat oddly placed on the twigs of *Loranthus* in lying across the twig instead of what is more frequent, along the twig. I am sure this is not accidental. You will see why when I send you material. The pupa in this position resembles a flowering cushion. Undoubtedly the imago, whatever it is, must be first cousin

to Lamborn's delightful "gall" [*A. maesa*]. It is very similar in "poise" and shape. The form with the most markedly "electric" [pp. 376-77] larva (which is a beautiful "Blue" with long tails [*Tannetheira timon*]) has also pupated. I have put the other in spirit. I bred out an imago before from a pupa. I have lots of pupae of a third and apparently common form [*A. paneperata*]. I think I sent it before along with one which I noted as having an exactly similarly shaped pupa, but more "decorated" [*A. iulus*]. For some reason I haven't got any of the latter just now. The pink forms [*E. iasis*] are beginning to appear now that the flowers are beginning to show more colour though still unopened.

I cannot help thinking that the *Loranthus* series really are avoided by ants. I am not saying this simply because I wish to find a meaning for the "electric" sensation [see p. 376]. I noted it before I knew of that. There are *Pheidole* on the tree, but they are in attendance on scales and are partly, I think, attracted by the nectaries of the *Funtumia* flowers. Further, I took a lot of the same *Pheidole* from *Cassia alata*, where they are in attendance on a Jassid, and put them into the *Argiolaus* box, but they took no notice of the larvae. Two of the species have tubercles. I cannot find them on the species à camouflage [*E. farquharsoni*]. But I cannot find glands on any of them.

Jan. 8, 1918.—None of the new *Argiolaus* have emerged as yet, but I've a nice group of them and next mail may bring you some good things.

Jan. 12, 1918.—I am glad to say that I am in a position to make one emendation, and that is that there are more than two *Argiolaus* on the *Loranthus*. I know of FIVE on the particular *Loranthus* on my most particular *Funtumia*, and in addition it is practically certain that the famous "gall" [*maesa*] and the other which I sent home as "gall affinis" [*alcibiades*]
—I haven't the names handy at present, but you sent me them before—almost certainly feed on the same species, though, as I told you in my last letter, the "gall" and the other one elect to live up a very tall tree, much beyond my reach—the *Alstonia* frequented by *Cremastogaster*, *Hewitsonia* and the others. The "gall" and one of my *Funtumia-Loranthus* forms live on the *Hewitsonia-Endomychid-Cremastogaster*-tree at Agege, which bears a very closely related *Loranthus* with purple red-tipped corollas instead of yellow and red-tipped, which by the

way—the host-tree, I mean—is *Antiaris toxicaria*, var. *africana*.* I had just posted my letter on Tuesday when I found on my *Funtumia-Loranthus* still another extraordinary looking larva, very similar to the “camouflage expert” in shape, but in colour nearly black, a sort of dark “mole” colour except for one or two tiny white and brown spots posteriorly. I have searched for others without success and sadly believe that I must have missed them, for the one I had looked like a little bit of dead leaf that had accidentally stuck on a flower. I rather think it is the larva of the “decorated” pupa *Argiolaus* [*A. iulus*] to which I referred in my last letter. [It was the larva of *E. laon*.] I have one of these pupae by me and will soon be able to clear up the point.

Three of my “camoufleurs” [larvae of *E. farquharsoni*] came by an untimely end in a very curious way. A moth (? Pyralid) larva is present in considerable numbers on the flowers. I must have overlooked the presence of one or two of these in one of my tins in which the *Argiolaus* larvae were feeding. They in due course “went up,” and I didn’t trouble to put in more flowers. The wretched moth larvae attacked three pupae and devoured the contents, to my intense annoyance. If they had eaten the common species I wouldn’t have cared so much. Still, I’ve got four perfect imagines and there are some more to come, for I got three that had pupated on the lichen-covered bark of the *Funtumia*, so wonderfully cryptically coloured, just like little burrs on the tree-stem. I tried to photograph them, but my plates have got heat-fog and I cannot get good definition.

I wonder if I mentioned that I have got another *Loranthus* (same species) on a *Funtumia* close by the *Cremastogaster*-tree and infested with outposts from the main ant-nest. It is in flower like the *Argiolaus* one, but not a single specimen can I find on it. I must draw a plan of the ground showing distances. I introduced *Cremastogasters* in numbers into a tin containing about a dozen *Argiolaus* larvae, but they made no attempt to attend them. The *Argiolaus-Loranthus* off which I could have got dozens of larvae is but sparsely ant-infested, *Pheidole* sp. being the ant, and they are in attendance only on various *Coccidae* on the *Loranthus*. I can, I think, definitely say that these

* Dr. Stapf informs me that the name *toxicaria* has never been published, and the species is *A. africana* Engl.

larvae are *not* ant-attended in that particular instance at any rate. They have tubercles, seldom extruded, but I really cannot make up my mind about the gland. I have never seen any evidence of secretion, but I have thought I detected the "lips" of a gland. It may be rudimentary. I'll put up a few of the commonest species in spirit for sectioning. In the common, onisciform, ant-attended Lycaenids that I have met, there is no chance of missing the gland. The drop of secretion is always to be seen. The *Argiolaus* larvae also "spit," when handled, a drop of liquid which is at first clear but quickly turns green. It is probably acrid, but I haven't summoned up courage to try.

Jan. 26, 1918.—I have posted for this mail two small boxes, chiefly devoted to the *Loranthus* series of Lycaenids. Six different species are sent, with a larva of four of the species.

The A series [*T. timon*] is not very common. I have only three imagines, one of which only I have sent this mail (so that I may have another try in case the submarines get them). It is a beautiful form as you will see.

B [*A. paneperrata*] is perhaps the commonest one, *is*, in fact, till the *Loranthus* flowers are mature and open, when the D [*E. iasis*] series is predominant and common. The B larvae are green—a sort of mistletoe-leaf green. The D series have yellow or red larvae, and may be red when young and later yellow to match the predominant colour of the flower.

The C series [*E. farquharsoni*] is the type with the wonderfully cryptic larva. I cannot describe the colours, but imagine a blend of greens with tiny points of brown or red, such as you can find, say, on a tuft of *Peltigera* or *Cladonia* lichen. I have sent only one pupa-case, not in a typical situation. I'll send you these later, for I'll have to glue them to a small box to be effective.

F [*A. iulus*] came from the *Cremastogaster*-tree (not the *Funtumia-Loranthus*, though the parasite is the same in both cases)—*Alstonia*, the same species as the *Teratoneura*-tree, but a different specimen. But I once bred it before from the *Funtumia-Loranthus*. The larva is very like the B [*paneperrata*] type.

The G series is my "gall affinis" [*A. alcibiades*], and is from the *Alstonia-Loranthus*. I haven't sent a "gall" [*A. maesa*], though I had a fine one that got damaged. I have a lot to send yet, but am to distribute them over a few mails.

E, the other wonderful *Loranthus* larva [of *E. laon*]—the dark mole-coloured one—pupated and will, I think, emerge to-morrow. The pupa is extremely like that of C [*E. farquharsoni*].

Feb. 8, 1918.—Lycaenid (*Loranthus*) E [*E. laon*] is the one with the mole-coloured larva. The pupa is extremely like that of the C [*E. farquharsoni*] series—the ones with the “rugose” larva with the lichenoid colouring.

Feb. 14, 1918.—I hope my last little collection gets home, especially as one of the *Argiolaus*, type E [F had been written, evidently in error], is a unique one. I haven't a duplicate, and I hope the pupa-cases sent of the C group [*E. farquharsoni*] will reach you all right. They are on natural substrata, as found in the open.

I think I must have accidentally mis-described the Nematode-infested larva, which is one of the B [*A. panepinata*] series of *Loranthus* Lycaenids [see p. 366].

March 2, 1918.—In the box I send you is a tube with the Filariid worms from the B *Loranthus* Lycaenid larva. I also send you duplicate larvae of the B and C series. There are signs of more flowers soon, and I may get some more. The first of the series are home anyhow. I hope the second lot will get there, for it contains the unique E specimen. You will see that I send you still another of the rarer A type [*T. timon*] which is the most beautiful of all, I think.

March 23, 1918.—I think the whole of the *Loranthus* series have got home, and I am waiting as patiently as possible to hear what they are.

April 17, 1918.—I am looking forward to the identification of the *Loranthus* series. It was luck to get them all home, especially as one of them was a unique specimen. I'll prepare herbarium specimens of the host-plant when it flowers again. It is not a pubescent species, but has thick, “cold,” almost succulent leaves, which are quite glabrous. So also are the flowers.

April 28, 1918.—I duly received your long letter with all the details about the *Loranthus* Lycaenids. The host-plant is just coming into flower, and I will make a point of getting material for Kew. In spite of a certain dissimilarity of the larvae, there is an unmistakable broad similarity, and I suppose the genera are nearly related.

May 28, 1918.—I am busy getting ready to hand over to the Director of Agriculture, who is now on his way out, and have only time for a short note about a parcel I send you by this mail. There is nothing of any consequence in

it. I have sent an extra lot of the B series [*A. panepinata*] of the *Loranthus* Lycaenids, of which so many came out that I got the numbers mixed so I have not the cases. My stock of tins was too limited to give them all extra boxes. However, I send them really to see how the sex proportion will turn out. The B species is, I think, the commonest of all, then the D [*Epamera iasis*]. The "gall," *A. maesa*, and *alcibiades* are not uncommon either. They are, of course, if one doesn't know where to find their larvae, practically all *uncommon*.

The larvae are all quite distinct, and yet there is a general similarity of shape and in "poise," also of the pupae. The pupae of C [*E. farquharsoni*] and of the unique specimen E [*E. laon*] are really very similar, as are their larvae, although widely different in colour. Their shape is not so very different from the "gall" larva, but is very different from either A—*Tanuetheira timon* (a nice name and appropriate), or B—*Argiolaus panepinata*. A and B larvae are very similar, but differ a little anteriorly in A larvae having an extra pair of little prominences. Both are of the same dull green colour.

D [*E. iasis*] rather differs, though its shape (larval) is to my mind strongly reminiscent of B. Its colour varies from yellow-orange to red (the red of a Bryant and May non-safety match). Its pupa, though differing in colour, yet to me recalls B, especially, and B's pupa again is just like a small *alcibiades*. The larvae of *alcibiades* are like very large B larvae. As I have said above, to my thinking the larvae of C, E and *maesa* form a natural group. I can assure you that I could not mistake the larva of any one of them for that of any other. The pupae are also distinct. The only two that I might confuse as pupae would be C and E. The "decorated" pupa F is extremely reminiscent of B, and, by the way, its larva, which I didn't get this time but got once before, is to my recollection very like that of B and at the moment I cannot recall how to distinguish them. The affinities of the series to me then may be represented thus:—

$$\text{Group I } \left. \begin{array}{l} \text{A } [T. \textit{timon}] \\ \text{B } [A. \textit{panepinata}] \\ \text{F } [A. \textit{iulus}] \\ \text{G } [A. \textit{alcibiades}] \\ \text{D } [E. \textit{iasis}] \end{array} \right\} \text{ especially A, B and F.}$$

Group II $\left\{ \begin{array}{l} \text{C [E. farquharsoni]} \\ \text{E [E. laon]} \\ \text{A. maesa.} \end{array} \right.$

[The above-mentioned eight species are all included in *Iolaus* by Aurivillius (Rhop. Aethiop., p. 546), whose order is followed on pp. 361-63, although the genera of other systematists are accepted. To become consistent with these, *Argiolaus maesa* should change places with *Epamera iasis* in Farquharson's groups, thus bringing together all the species of each genus. Farquharson considered that the pupa of *iasis* resembled that of *paneperata*, but the single example sent is clearly the short pupa of an *Epamera* with the characteristic position. The pupa of *A. maesa* is greatly modified, and its affinity obscured by its extraordinary resemblance to a gall. The bud-like pupa of *T. timon* is of a very different shape from that of *Argiolaus*. Farquharson's material and observations taken as a whole appear to me to support the validity of the three genera *Tanuetheira*, *Argiolaus* and *Epamera*.]

Aug. 11, 1918.—I think you will have got my letter in which I attempted to relate the members of the *Loranthus* complex according to larval characters. I think *Epamera* was my expectation. Before I leave these, I think I said before that these larvae are *not* ant-attended. The particular *Loranthus* is a parasite on a *Funtumia elastica* about fifty yards from the *Cremastogaster-Alstonia*, from whose numerous *Loranthus* parasites the "gall" comes very commonly. But on the *Funtumia-Loranthus* there are practically no ants at all, except a few *Pheidole*, which absolutely ignore the larvae. I am certain that I never found one larva attended by ants on that tree. Now, oddly enough, not twenty feet from the *Alstonia* is another *Funtumia* (same species) with a gorgeous specimen of the same *Loranthus* on it. It is simply infested with *Cremastogaster*. It is from it that I took the specimens for Kew, and though I have searched again and again at the same time as I was getting larvae from the other *Loranthus*, I never found a single larva on it. Yet *alcibiades* and *maesa* regularly come down the *Cremastogaster*-infested trunk of the *Alstonia* to get away from the tree for pupation, but they are, I think, left alone, till pupation at least. Not infrequently I have seen cases where the larva had pupated on a weed too near the tree, and the ants had discovered the pupa and destroyed it.

Aug. 12, 1918.—I have posted two parcels, one containing a flowering specimen—in spirit—of the *Argiolaus-Loranthus* [*L. incanus* Schum. and Thonn.]. I shall get fruits later.

10. An "Electric" Sensation caused by handling the Larvae of *Argiolaus* and allied Genera.

Dec. 27, 1917.—Xmas here was a very quiet time. I spent all of it, except the evening, in the open and was on the whole rewarded. I made a curious discovery in handling two (species, I think) of the *Loranthus* larvae. These larvae are of very characteristic shape, which is difficult to describe. They are rather Molluscoid or Linacoid than onisciform, though they are smooth except at the margin, which is minutely bristly, doubtless to protect the feet. The "carapace" besides comes right down so that the feet are not visible. In section the larvae are more or less triangular. The posterior part is bilobed, and in one of the species there are little lobes anteriorly. They have tubercles, exerted very rarely, but if they have a gland it is hard to see. I recall my note above [pp. 369, 370] on the absence of attendant ants in view of what I am about to tell you, which I had not observed before. These larvae are relatively large so that it is possible to lift them between the finger and thumb towards the anterior end, and without the skin of the fingers coming in contact with the marginal overfold. In handling one of these, I suddenly was conscious of a curious sensation in my finger and thumb which is very difficult of description. As near as possible it reminded me of a very faint electric shock, not accompanied by a prickly sensation but rather as if one were being tickled by a tiny brush of slightly strong bristles. Now the skin of the finger and thumb, or the parts used in handling a small object is fairly hard and not over-sensitive. I doubt if mere surface mechanical irritation by minute bristles, which I cannot detect even with a $\times 10$ Zeiss pocket lens, could have produced the effect. The sensation was not that of tickling so much as that of a faint shock, which was not continuous but rapidly intermittent. The skin of the larva is covered with yellow dots, very minute and scarcely visible to the unaided eye, like glandular dots on a leaf. To make sure that the whole thing was not illusion I got my boy to hold one and to say if he felt anything. He replied in good "pidgin"—"he scratch my hand," by which I think he meant tickles. At any

rate, so far as I can make out, there is nothing on the larval epidermis to scratch anybody's hand. On putting the larva down there was no after-sensation which hardly indicates stinging. I had another larva very similar in appearance but a different species—if anything smoother. I thought at first that it had not the same property. I tried it on the boy and he felt it. I tried it again myself, but though it was rather less pronounced than the other, there was no question about it responding in the same way. I will put up spirit material and perhaps Dr. Eltringham will investigate the nature of the gland-cells, for I'm sure the minute yellowish dots are the seat of the response, whatever its nature. I myself believe it to be electrical. I find it hard to say why, except that it reminds me of nothing else so much as the queer "internal" tickling that a faint discharge produces. "Internal" is the only adjective I can think of, meaning thereby that the sensation is felt up the inside of the finger, as it were, rather than on the surface, like tickling, in fact. I do not know the vocabulary of experimental psychology, but perhaps you see what I am trying to get at. The cryptically coloured, knobby larva [of *E. farquharsoni*] does not possess the property. I have got, I think, ten of these now, but none so far have pupated.

Dec. 29, 1917.—The larva [of *E. farquharsoni*] is slightly "electric" also, perceptibly so in well-grown larvae. *Tanuethira timon* is the form with the most markedly "electric" larva.

March 23, 1918.—I thought of an electroscope, but I fear that is beyond my reach, though I may manage to borrow one at the High School in Lagos.

[Dr. Eltringham is inclined to think that the "electric" sensation may be caused by a shivering motion of the larva, causing the rough cuticle to vibrate against the skin: pp. 484-85.]

B. NOTES ON THE LIFE-HISTORY OF TWO SPECIES OF
DEUDORIX AND ONE OF CATOCHRYSOPS WHICH BORE
IN THE PODS OF CANAVALLIA ENSIFORMIS D. C.
(LEGUMINOSAE).

[The following material illustrates the notes:—

1. *Deudorix antalus* Hopff.—2 ♂ 5 ♀, emerging Feb. 19-23, 1918, and 1 ♀ March 1. Each of the former 7 is

accompanied by its precise pupa-case. Also from larvae collected on *Canavalia* at Agege—3 ♂ 1 ♀, emerging March 2-7.

2. *Deudoria odana* H. H. Druce.—1 ♂ 2 ♀, emerging Feb. 21-22, 1918; each with its precise pupa-case, that of the ♀ of Feb. 22 remaining in a tightly rolled leaf or pod, bearing Farquharson's note—"butterfly somehow managed to emerge." In spite of the very small opening it is a fine specimen. The larva must closely resemble that of *antalus*, for this keen and most observant naturalist thought he was dealing with a single species of large larva and accordingly labelled both with a single series of letters following the order of emergence. He would of course have detected the difference between the butterflies, but there is no doubt that these were packed off at once without examination. Farquharson's is the first record of the early stages of the species. Although the male of *odana* appears to be common—Lamborn took a fine series at Oni—the female has rarely been seen; indeed, I only know of two other examples, both in the collection of Mr. Bethune-Baker, who has now kindly drawn up a short description of this sex and added a note on the variation of the species (p. 463).

3. *Catochrysops malathana* Boisd.—1 ♂, emerging Feb. 19, 1918; accompanied by its pupa-case. Also bred by W. A. Lamborn from a Leguminous pod and sent accompanied by attendant ants (Trans. Ent. Soc., 1913, p. 488.)

Feb. 4, 1918.—The Harmattan is very strong just now and insect life is hardly at its maximum activity. In fact things are hard to get. I drew a complete blank yesterday—my Sunday—much to my disgust. However, this evening things brightened a little. I got a *Pterocarpus* larva [p. 385]. I think they are about to appear, and I took it into my head to look for a *Catochrysops* on a bean we grow here, *Canavalia gladiata*—or *ensiformis* I believe it is—: I'll look it up, in view of the possibility of a revision of the genus. Lamborn, I remember, bred one out of the pods of the Pigeon Pea, *Cajanus indicus*, here, which he told me was *C. malathana*. I remember it went to the B.M., being an official matter, and if my memory serves me aright, he learnt to his surprise that it was something else, something or other *boetica*, I think, but the B.M. will be able to tell you. I pass *Canavalia* plots every day and I have looked casually at them too without result, but other things were

trumps just then, such as *Argiolaus*. But I was driven to concentrate on it to-night. Virtue had its own reward! I have got two species of Lycaenids, one I think a *Catochrysops*, the other looks rather more like my *Pterocarpus* friends, but I'm not really sure. I don't know it anyhow, and it's a fairly useful-looking larva—not a tiny form. I've got six and I'll get more now I know where to find them. Mr. Masee, who saw more in the field than ten average men, used to quote to me a saying of M. C. Cooke's which was something like this: "If you can't find a thing (that you have reason to think ought to be there) sit down till you do find it." It isn't bad advice, if one really has the luck to have good eyesight and something of a field instinct. I've got the eyesight all right, but as for the field instinct—well I must touch wood. The more I find the more I marvel how I missed the things so long. The little bush we have left here and the Harmattan together have reduced me to a "field" of 4 or 5 ant-trees.

Feb. 5, 1918.—*Canavalia* is of the family Leguminosae. The species on which I find the Lycaenids is, I think, native, but it is one widely cultivated in the Old and New World tropics, and ours are actually grown from introduced seed. Yet a wild form (if it isn't a distinct species) is common round here.

There are without doubt two Lycaenids concerned, both boring into the pod—one a typically onisciform one which I think will prove to be "*malathana*;" but the other is very different—a plump, rather large larva that at first sight suggests a slightly pigmented Coleopterous larva or an Aegeriid. I was at a loss to recall what they did resemble more than Coleopterous larvae. Then I recalled the Aegeriids and had a spasm of doubt; but there *is* a gland, though it doesn't seem to function often, but the larvae are attended inside the borings by a tiny ant like a rather dark-coloured *Monomorium*. But the larva bores right inside the large bean: it is bigger or at least fatter than a broad bean, and the presence of larvae is indicated either by fresh frass round the opening or by a busy little crowd of ants running in and out. The little ant is always on the plants, larvae or no larvae, the inflorescence being very glandular. In addition a Jassid is present in small numbers. The larva is really quite Aegeriid-like, of a straw-colour generally, but with the anterior segment bright red, and rows of brownish purple spots along the sides. It is,

however, slightly bristly, recalling one at least of the *Pterocarpus* forms, only much larger. It must be quite a large species, or it is a horrid deception. We have the bean planted all over the place as a cover crop, but I have so far found the larvae only in the heavily shaded river-side plots. But in these there are abundant traces of their activities in the shape of holes, although I haven't met with a single pupa. The plots are clear of weeds, so that if they leave the host-plant for pupation they must travel a good way. Some of my larvae I am sure are replete and will pupate in a day or two.

Feb. 6, 1918.—The new larvae didn't pupate; I think it was a moult-rest, for they were all active this morning. I cannot see a trace of tubercles, but I am sure there is a Guenée opening, though the gland doesn't seem to function. Somehow I shall be glad when one goes up, for the larvae are rather odd in more respects than one. When feeding they are short and fat, but on the move they are quite long, longer than any Lycaenid larva I have yet met, and extremely Aegeriid-like except for the concealed head, which, however, is thrust out when they are full-stretched and walking. But a short and rather stout pro-leg process (p. 352) is present which is rather reassuring. The spots are rather variable in colour—purple-brown, I think, only in the younger larvae. More mature larvae have the spots a very unusual indigo-blue colour. The rather striking pigmentation, blue spots on a straw-coloured "ground" with a red head, is odd in a boring larva.

A few Sundays ago [Dec. 8, 1917: see p. 325] I saw a very recently emerged (but flying) and perfectly gorgeous, tailed "Copper" on the edge of a *Canavalia* plot where I have got several larvae. I am wondering if it may not be the one I'm on the track of, but I'll just have to possess my soul in patience. But I did tell that "Copper," with no little fervour, how much I'd like to see her oviposit on something. She didn't oblige, however.

Leguminosae seem to be favourite food-plants of the [Lycaenid] "herbivora" and "anthophaga." As a matter of fact, I had looked at the flowers of *Canavalia* two or three weeks ago, but drew a blank and only came to look at the fruits in case of a *Catochrysops* having taken an interest in the plant.

March 2, 1918.—By this mail I am sending you a small box with the *Canavalia ensiformis* Lycaenids. Only one

of the small forms has come out so far. I have a few to come, reared from the same plant at Agege, just to find out if there is any difference. They are fine large forms, rather resembling the famous "*Camponotus maculatus*" form [*Catochrysops phasma*, p. 392]. I have sent you the pupa-cases also. They have a most distinct silk girdle placed about the middle of the body. I was disappointed to find that it was not the gorgeous "Copper," but I may get these one day.

C. NOTES ON THREE LYCAENINAE, THEIR PARASITES,
AND TWO MOTHS, FEEDING ON THE ANT-INFESTED
FLOWERS OF PTEROCARPUS ESCULENTA SCHUM. AND
THONN. (LEGUMINOSAE).

[The following material illustrates Farquharson's notes:—

I. Lepidoptera.

1. *Deudorix (Pilodeudorix) diyllus* Hew.—10 ♂ 9 ♀, emerging March 11–20, 1917, each of the first 10 with its precise pupa-case. Emergence takes place about 8.0 or 9.0 a.m., as may be inferred from the following data on the labels: 8.0 — ♀; about 8.0 — ♂; after 8.0 — ♀♀; after 8.30 — ♂ ♀; 9.0 — ♂. An example of the larva, which is distinguished from that of *camerona* by its more tuberculate appearance, is figured by Dr. Eltringham on Pl. XIII, fig. 14, p. 484; and a ♂ pupa on Pl. XIII, fig. 8, p. 484. The pupa resembles on a small scale those of *Deudorix antalus* and *odana*. The female imagines of this species and *camerona* are briefly described by Mr. Bethune-Baker on p. 464.

2. *Deudorix (Pilodeudorix) camerona* Plötz.—2 ♂ 2 ♀, emerging March 15–18, 1917, a ♀ of March 15, "after 8.30 a.m." A ♂, March 16, bears the note "? Less tuberculate larva," and a ♀, March 18—"Smooth larva."

3. *Lycaenesthes musagetes* Holl.—1 ♀, emerging March 18, 1917. It bears the note "From green onisciform larva." The early stages of this species, as of *diyllus* and *camerona*, were unknown.

For a preliminary announcement of the breeding of these three Lycaenidae see Proc. Ent. Soc., 1917, p. lxi.

4. *Maruca testulalis* Hübn.: *Pyralidae, Pyraustinae*.—1, emerging March 13, 1917. A moth of world-wide distribution.

5. *Olethreutes* sp. nr. *wahlbergiana* Z.: *Tortricidae*.—1, emerging March 11, 1917.

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II. Diptera.

6. *Exorista poultoni* Villen., sp. n.: *Tachinidae*.—1 ♂, bearing the note "Ex *Pterocarpus* Lycaenid." The date was some time in March, 1917. This brilliant black species has been kindly described by Dr. Villeneuve on p. 518. This fly and the following Ichneumonid were parasitic on one of the species of *Deudorix*, probably *dyllus*.

III. Hymenoptera.

7. *Adelotropis farquharsoni* Waterston, gen. et sp. n.: *Ichneumonidae*, *Joppinae*.—Bearing the note "From *Pterocarpus* Lycaenid. 22.iii.1917." Described by Dr. J. Waterston on pp. 455-58.—E.B.P.]

Feb. 27, 1917.—I was in luck's way on Sunday. . . . Just lately the orange-yellow blossoms of a small tree that grows along the river-bank, at times with its roots entirely in the water, have been very conspicuous. The tree I was told was a species of *Pterocarpus*. To verify this and to get a nearer view I went down to one of the more accessible specimens. [The presence of an empty pupa of *Argiolans* type just below the tree, as alluded to on p. 366,] led me to look rather closely at the *Pterocarpus*, the first non-botanical feature observed being the presence of *Occophylla* nests, and workers running about the leaves and inflorescences. I pulled down a flower-bearing branch very gently, it was the only one within reach and had to be carefully handled. *Occophylla* is a jealous animal, ἐβρισιζόρ τι. Then I saw what I took to be a Limacod larva, not so brightly coloured as these usually are nor the characteristic green or yellow, but spiny and tuberculate and of a russet colour not unlike that of a withered *Pterocarpus* flower. Two ants were running about the inflorescence, but up to this point I didn't associate them with the larva. I was in two minds whether I could spare the time to breed out a Limacod (the larva was, for one of these, rather small and doubtless young), and for some obscure reason decided to take it in. I shook the ants off the flower and did so. Force of habit made me examine its wonderful armament with a lens, and I thought I detected a pronounced non-Limacod character. I soon satisfied myself that it had tubercles and a Guenée gland. Very soon I had in the tin a more discerning *Occophylla*, which made

straight for the gland and tickled it in a way that an *Oecophylla* doesn't usually tickle other animals. I couldn't reach another inflorescence, so hastened home for a more leisurely study. What I believe to have been a Psyllid jumped off the flower, but I thought there would perhaps be others concealed among the flowers, which are rather crowded. In this, as it turned out, I was disappointed. I got out Lamborn on the "Relationships," [Trans. Ent. Soc., 1913, p. 436], and decided that I'd got hold of a larva not unlike that of *Megalopalpus zymna*, with a new attendant ant perhaps. I noticed that the pro-legs had the curious little protrusible "sucker" that I have seen in *Hewitsonia* larvae and in others of the "hairy" group, though this one is not of that type at all, being sluggish in its movements and of onisciform habit (but for the tubercles and spines, with the overlapping "carapace" concealing the legs), and while intently watching these details through the glass cover of the little box in which I'd put it, noticed for the first time that it was not a "carnivore," but was contentedly devouring the corolla of one of the flowers forming the inflorescence, just like any ordinary, common, garden caterpillar. I had a further search through the "Relationships" to see if any spiny form described by Lamborn had such comparatively refined tastes, but found, unless I have overlooked some detail, that his were very gross feeders and that some had in fact been guilty of the "basest ingratitude," for reasons well set forth therein. But I cannot persuade myself that he didn't find this one, if not at Oni, perhaps here. I have since managed to get one or two more, but none have so far pupated. But I am fairly hopeful unless something goes wrong.

Feb. 28, 1917.—I rather think one or two of my *Pterocarpus* Lycaenids are about to "go up." If not they are about to "go West."

I have had a further study of the larvae. Their colour is not the simple russet that I supposed, for on closer examination with a lens and by the microscope (reflected light) I find that there are little areas of a sort of olive-green colour and others of such light brown as almost to be yellow. The very young larva is, however, pale straw-coloured. The larva is very sluggish, and I got a good view of the tubercles in action with the aid of the microscope. The tubercle of this species, at any rate, is not an organ

thrust out through an orifice. It is rather a diverticulum of the epidermis (though other layers may be involved) which is invaginated and exerted alternately. It is crowned by minute "tentacles," which so far as I can make out are not distinct hairs but are produced by a lobing of the upper part of the tubercle. I could not actually detect any orifice, these tentacles being so numerous. Very likely their structure has all been written up, but it may interest you to get this impression of a study of the living larva. I am a poor artist, but I'll try to express my meaning in a rough sketch. The invagination appeared to me to be aptly comparable to the effect produced by one in turning a stocking inside out (the initial stage) or a glove finger.

I am afraid my sketches are hopeless, but when the tubercle is completely retracted the position of the tubercle shows a slight pit with a "pursed" centre. Looking down on the point by reflected light it had a curious resemblance to a starch grain under high magnification, rather like this [sketch]. The extrusion of the tubercles was rather spasmodic. I could not, of course, study it with an *Oecophylla* in situ, for freedom was more attractive to the ant than the Guenée gland. Sometimes the tubercles would continue invaginating and being extruded rapidly for a short space of time and then stop, to be resumed after a bit. I hope to study the movements more in the next few days.

March 1, 1917.—One of my *Pterocarpus* Lycaenid larvae pupated to-day. Another was on the way, and I was wondering why it didn't, when I noticed an "injury" just behind the head on the dorsal surface. I soon discovered the cause, for a wretched Tachinid puparium was lying in the tin and I very nearly overlooked it. It has struck me that this particular Tachinid has made an unlucky or at least risky selection of a host; for the tree always overhangs the river completely, and if the emerging larva is unable to freeze on to anything it would stand a mighty chance of a watery grave. The Lycaenid itself might have done better, for the inflorescences appear to provide food for two or three moths, a beetle, Psyllids and possibly other things, and can't possibly mature many fruits. So hopelessly damaged are some of the flower-heads that what is left is almost sure to drop off into the water. I haven't seen the Lycaenid pupae in

the open yet, and the one I have is simply lying loose in the box. It didn't manage to stick on to anything. It possibly hangs or sticks on to the withering inflorescence of which the calyces at least are persistent, which may explain the minutely spinose pupa-case, though this character may quite as well be protective, for the inflorescence is not very tomentose, at least what remains of it when the withered corolla falls off. . . . I am curious to see the next pupa. The one I have now is mottled with small dark green (?) spots, with a brownish ground, and would be very inconspicuous among half-withered vegetation.

March 9, 1917.—I will be able next mail to send the *Pterocarpus* Lycaenid (or two perhaps, for I'm not sure, but I'm dealing with two very similar-looking larvae) along with the others. The first of these ought to come out to-morrow or Sunday. Two are tachinised. Now I must stop this unwieldy letter. I hope I have escaped the Scylla of mal-observation and the horrid Charybdis of bad philosophy. At any rate, I'll make certain that I have a very good box of material for next mail. I think I'll send it in two lots in case one lot gets torpedoed. The *Pterocarpus* flowering is just getting finished, and I won't get more material there for a time.

The *Pterocarpus* pupa has a girdle fixing it to the surface it pupates on. In the case of the first pupa I must have accidentally broken this in clearing away the remains of the food-plant and excreta.

March 11, 1917.—Two of my *Pterocarpus* Lycaenids emerged to-day. For the size of the larva, which is relatively large, the imago is very small, with small tails on the hind-wings. The first one emerged about 9 a.m., just before I started on my usual hunt. It was not out at 8.30 when I finished breakfast. In the interval I was getting tins ready for the foray. I did not see the second Lycaenid emerge, for I did not get back till a little after noon, very thirsty, very hot, but fairly well satisfied.

March 18, 1917.—I have now got about 20 imagines of the *Pterocarpus* Lycaenid or Lycaenids, for I think there are at least two and possibly three, unless the larva is a variable thing. I will write details with the specimens.

March 2, 1918.—For some obscure reason I have so far drawn blank in *Pterocarpus*, finding only three larvae, all of which I lost, one parasitised, the others by mould, I think. [One larva, taken Feb. 4, 1918, is mentioned on p. 378.]

D. NOTES ON THE LARVA OF LYCAENESTHES LUNULATA TRIM., FEEDING ON BERLINIA SP. (LEGUMINOSAE).

[The material consists of 6 ♂ and 2 ♀ imagines, all of which emerged Jan. 8, 1918.]

Dec. 29, 1917.—I got a solitary *Pterocarpus* larva to-day; the trees are just beginning to flower. I also made a gathering from a plant that I cannot as yet identify. The young leaves when first they open are a light reddish-purple colour—a very common form of young foliage in this part of the world. As they get older the leaves get tinged with green and finally green. I have a series of larvae coloured appropriately to the different stages, some being pale reddish purple, some the same but tinged with green, and some are bright green. I rather think they are all one thing, for the shape is rather characteristic, an unusually large onisciform type and rather flat, with gland and tubercles and attended by a *Pheidole*—vigorously attended.

Jan. 12, 1918.—There is no doubt these larvae adapt their colour to the food-plant, some being green, some red. So also does one of the *Loranthus* larvae [*Epameru iasis*, p. 372; also a Labiate-feeding Lycaenid larva—pp. 400–401].

Jan. 26, 1918.—The *Berlinia* series all emerged on the same day. I couldn't separate the cases as they "went up" before I could separate them in the tin, but I'll get more.

Feb. 5, 1918.—In case I forget to mention it, *Berlinia* belongs to the Leguminosae, the species on which I found the Lycaenid being a large rain-forest tree *typically*, but here growing by the river-side.

Aug. 11, 1918.—I have been looking for more larvae on *Berlinia*, but the trees have no young foliage at present. The larvae do not eat the old hard leaves. There will be no difficulty, however, about getting them later on.

[The trees were still the same on Aug. 25, when the statement was repeated that "the larvae certainly vary from red to green."]

E. THE LARVA OF LYCAENESTHES CRAWSHAYI BUTL., FEEDING ON CASSIA ALATA L. (LEGUMINOSAE).

[Material:—1 ♂ 3 ♀ of *L. crawshayi*, emerging March 21–22, 1917: also a dwarfed ♀, probably of this species, with its pupa-case, from a larva found on the stem of *Antiaris africana*, at Agege.]

March 18, 1917.—I have also some other Lycaenid larvae at present, off *Cassia alata*. I think Lamborn had these too when he was here. They are, I think, vegetarians, though the plant is covered with Jassids.

Agege.

Sept. 27, 1917.—I forgot to mention that I found a tiny Lycaenid larva on a *Cremastogaster-Hewitsonia-Argiolaus*-tree here, which pupated—the tiniest butterfly pupa I've ever seen. I hope it will emerge all right. I must tell you of it later, as the boy must now run to catch a little local train from Agege to Lagos.

Moor Plantation.

April 17, 1918.—I am a little surprised to hear that the tiny *Antiaris* Lycaenid may be the same as the *Berlinia* one; the pupa-case and the larva were really rather different. [Relying upon memory I had, by a slip, written *Berlinia* instead of *Cassia alata*.]

F. THE LARVA OF TRICLEMA LAMIAS HEW., FEEDING ON THE COCCID LECANIUM (SAISSETIA), ON IMBRICARIA MAXIMA POIR. (SAPOTACEAE).

[The material received is as follows:—

1. *Triclema lamias* Hew.—1 ♂, emerging Dec. 25, 1917; pupation Dec. 15–17. The specimen is accompanied by its pupa-case, also by the case of an example (pupation Dec. 15–17; emergence Dec. 24) not itself received.

2. *Lecanium* (*Saissetia*) *farquharsoni* Newst., sp. n. (p. 530).—♀ adults, old and young, together with nymphs. The attendant ants were not received.]

Dec. 13, 1917.—“I've just come back from my evening stroll. I went down to our old haunt (Lamborn's and mine) to look into the welfare of two Lycaenid larvae that have, for the last few days, been slowly devouring a happy family of Coccidae (? *Lecanium*) on a young plant of *Imbricaria maxima*. Of them more anon.” [Quoted from Proc. Ent. Soc., 1918, p. xxx.]

Dec. 24, 1917.—The two Coccid-eating larvae that I found on *Imbricaria maxima* pupated in my absence in Agege last week-end. The first emerged to-day. I have an idea that it is very near Lamborn's *L. lachares*.* The

* The under surface pattern is, as Farquharson wrote, very like that of *L. lachares*. The genera *Triclema* and *Lycaenesthes* are closely allied. Aurivillius groups all the species under the latter genus.—E.B.P.

upper surface of the wings is black, the under of a pattern very like that of *lachares*. I have spirit material of the Coccids and have attendant ants. The other imago will emerge to-morrow. The larva was green (dull), onisciform, with just a hint of a white line along the edge of the mantle and a slightly lighter mid-dorsal line. There was a gland, but I could not see any sign of tubercles.

Aug. 11, 1918.—Before I forget I must clear up the point about the *Imbricaria*-Coccid-eater. The larvae were not fully fed when I collected them. Fearing that I might lose them, I cut off a twig with the Coccids on it, and completed the life-history in my house. [This was in answer to a letter in which I pointed out the extreme interest of the observation and the importance of confirming it. Lamborn had shown that the larvae of the allied *T. lucretilis* Hew. is associated with Coccid-tending ants, but did not think that they were carnivorous (Trans. Ent. Soc., 1913, p. 486). Farquharson's notes suggested further observation of this latter species. Lamborn had seen the larvae eating the dark green cortex of a soft plant, but at some later stage they may have attacked the ant-tended Coccids he found in tunnels in the same stems.]

G. THE LARVA OF *LACHNOCNEMA BIBULUS* F., FEEDING ON SECRETION OF IMMATURE ANT-ATTENDED MEMBRACIDS AND ON LIVING MEMBRACIDS AND JASSIDS: ITS PUPA ATTENDED BY *CAMPONOTUS*.

[1. The material of the 1915 note:—

Lachnocnema bibulus F.—1 ♀ (var. with quadrate pale spot outside end of F.W. cell), emerging June 4, 1915; with pupa-case, and a ♂ of *Camponotus maculatus* F., sub-sp. *melanocnemis* Santschi, bearing note "Actual ant found in association with Lycaenid pupa." Many additional workers were sent: see p. 423.]

July 3, 1915.—No. 5 is a Lycaenid about which I am very curious to hear. I found the pupa near an exit of the large *Camponotus* var. [nest: see p. 423], with the ant 5*b* apparently stroking it with its antennae. This may have been accidental. You will be able to judge when you see the Lycaenid (if it reaches you safely), for it may be one described, as regards its relationships, by Lamborn. Till I hear from you on this point I will make no further comment. 5*a* is its pupa-case.

[2. The material of the 1917 and 1918 notes:—

Lachnocnema bibulus.—2 ♂ 3 ♀. One ♂ and one ♀ pupated March 13, 1917, and emerged March 22; a second female emerged on the same day, all 3 with precise pupa-cases; a third female emerged at Ogo, March 25. The first-mentioned female bears the note "Larva on secretion of ant-attended immature Membracids on small Leguminous shrub," the other specimens a shortened form of the same. The second ♂ emerged Jan. 4, 1918. It is accompanied by its case and the note "Jassid-eater. New series, formerly found eating Membracids (1917)."

The attacks of this larva upon ant-tended *Jassidae* are described by Lamborn (Trans. Ent. Soc., 1913, pp. 470-1), and he thought, but was not sure, that the ants fed it. Farquharson's notes add greatly to our knowledge of the larval habits and food. For a brief preliminary statement see Proc. Ent. Soc., 1917, p. lxi.]

March 11, 1917.—I have seen another Lycaenid, probably one of those found by Lamborn, but perhaps my observations may complement or corroborate his. This one is part of a Membracid association along with a small black ant that habitually lives in the débris that collects in Oil Palm heads but forages down below. I once had two fine nests of them last year, many of the callows having mite "balancer" parasites. I lost the lot owing to my having to go travelling, most inopportunately, but I hope to do more on them later. They are probably a *Pheidole*. The Membracids (adults and nymphs) I found in a small Leguminous shrub at the base of a Palm, I think a *Tephrosia*, but it isn't flowering and I'm not quite sure. At any rate, it is the host of a very large number of Membracids, a much larger number of ants, and a few Lycaenid larvae. The larva, so far as I can make out, is without Guenée's gland and tubercles. It is rather bristly; the head protected by the usual "carapace." Its colour is a curious blend of the Membracid colour with additions. In appearance it reminded me very much of a large Syrphid larva that I found in Shagamu last year eating Aphids, and that larva resembled a bird-dropping more than anything else. The young larva is rather more bristly than the older ones and is less "ornithoscatoid." The little shrub is only about three feet high, and I could sit down more or less comfortably to see what they were doing. In the forenoon I couldn't make out what they really were doing. I remembered enough of the "Relationships" to expect to

see a few trustful Membracids callously devoured, but failed to see the murder done. Then I went the round of other interesting trees and so home. In the evening I went back, having read up *Megalopalpus* about six times [Trans. Ent. Soc., 1913. p. 458]. After sitting for the best part of an hour with about twenty or more ants in most hostile association with each of my hands, one holding the branch and the other the shrub, I came to one or two conclusions.

In the first place, I failed entirely to find out what the adult Membracid gives to the ants, and, as far as this afternoon's work goes, I am inclined to believe that they give nothing at all. The species, whatever it is, is rather tame, and I had no difficulty in watching both them and the ants.

Secondly, the particular larvae that I watched this afternoon made no attempt to eat the Membracids. The adults wouldn't wait, I imagine, to be eaten, but the relation of the Lycaenid larva to the Membracid, was with the larval stage of the latter, and that I saw as clearly as possible.

The Lycaenid larva is very sluggish in its movements and hardly moved an inch from where it was when I came, all the time I remained. Whenever a Membracid larva came near it got busy and so did the ants. They all got busy in the same quarter, which was the upturned, retroussé end of the abdomen from which at fairly rapid intervals a short process was thrust out, on the top of which a clear droplet was simultaneously visible and instantaneously mopped up by the most enterprising of the suitors, which was generally the Lycaenid, in virtue of its superior size. Along with one or two ants it tickled with its anterior true legs the business end of the Membracid, but by "lolling" (in contrast with the extremely active habits of the ants), in a gross and unmannerly way, right over the orifice, it hardly gave the ants a chance. When an ant did get there first it generally shared, by regurgitation, the good thing with a fellow, and I am inclined to think on one or two occasions with the less gracious Lycaenid. But they showed no ill feeling if the latter got there first, and though all the time they kept biting me with great vigour—though the bite is little more than a fairly sharp prickling sensation—they showed no disposition to attack the Lycaenid. That is as far as I have got with this particular larva. I saw a mature ♀ Membracid ovipositing exactly in the

manner described by Lamborn [*ibid.*, pp. 495-97]. I saw two empty Lycaenid pupa-cases on the shrub, which annoyed me because I had missed them. I do not think it would be possible to feed such a larva in the house, as the Membracid probably wouldn't thrive on a cut twig.

One would think that it would be a long time before a comparatively large larva would mature on such fare, and yet it is probably a more concentrated food than many caterpillars get. In connection with the food of the "*Hewitsonia*" type of bark-frequenters [pp. 342-46] I have been examining the frass of various larvae microscopically, and it is to me a great wonder what they take out of the ingested matter. There is no question but what they feed on the "cortex," by which I mean just the thinnest superficial layer (including epiphytic Algae, etc.), for their bites are not visible to the naked eye, nor have I picked them up with a lens. The *Pterocarpus* larvae [p. 383] passed abundant frass which was practically unchanged corolla tissue, unchanged as far as the eye could judge. I took in some fairly large moth larvae [p. 407] the other day which were feeding on a fern epiphytic on an Oil Palm. They ate at a great rate and passed frass as quickly. Unless their digestive fluids are very highly concentrated and very rapid in their action, they could hardly take anything out of the plant tissue. So perhaps the Lycaenid with his Membracids is wiser in his generation than these seeming children of light. I hope to get them when about to pupate, to examine their frass too.

March 18, 1917.—I have now got several of the Lycaenids of the Membracid association to pupate. I have paid several visits since first finding the larvae. I'm sure now that Lamborn knew of it, for I recall him asking me if I saw any resemblance to a monkey's face in the pupa. [For Lamborn's observations on *Lachnocnema* see Trans. Ent. Soc., 1913, p. 470; but the supposed resemblance to a monkey's face is in the pupa of *Spalgis*, also proved to be carnivorous by Lamborn and others: *ibid.*, p. 475.] There is that suggestion certainly, but I think, at a little distance off, the effect is much more of the bird-dropping order, in a different way from that of the larva, for the colours are those of brown paper and putty, nicely blended. I tried hard to make more of their relation to the Membracids, but without success. I saw one once again feeding on the droplet but not on the Membracids, but my visits

seemed to coincide with resting—probably from repletion—periods. I succeeded, however, in getting several larvae on the point of pupation and have examined the frass microscopically. There could be no doubt about the presence of insect remains in it. I will send some in due course for your confirmation.

I found in one pellet a mass of asci with spores (a type with a mucilaginous covering), but I couldn't find any perithecium, and I cannot suggest as yet what the fungus may be or how it came to be there. It must, I think, have spored before leaving the caterpillar's body, for I put the larvae when found into perfectly dry new pill-boxes, and the pellets are so small and would have dried so quickly that I can hardly believe the fungus spored after extrusion of the pellet. I don't think there can be any doubt but that the larvae do actually eat the Membracids, which is rather low down. But at the same time they feed directly on the secretions of the nymphs. I am still puzzled as to what they or the ants get from the mature Membracids.

Jan. 26, 1918.—I got my Membracid-eater and secretion-drinker eating Jassids, as Lamborn did, on *Cassia alata*, and send one.

H. THE MATURE LARVA AND PUPA OF *CATOCHRYSOPS PHASMA* BUTL., FROM THE SUBTERRANEAN NEST OF THE ANT *CAMPONOTUS MACULATUS* F., VAR. *MELANOCNEMIS SANTSCHI*: ITS YOUNG LARVA FEEDING, WITH THAT OF ANOTHER LYCAENID (PROBABLY EXHIBITING INDIVIDUAL COLOUR-ADJUSTMENT), ON THE FLOWERS OF *SOLENOSTEMON OCYMOIDES* SCHUM. AND THONN. (LABIATAE).

[Material:—21 ♂ and 18 ♀ *C. phasma*, emerging Sept. 12–25, 1917, from pupae found Sept. 10 in débris of the ants' nest at Agege, 33 with precise pupa-cases. Emergence takes place at about 8.0 a.m. or earlier, as shown by the following data:—about 7.0 a.m.—1 ♀; about 7.15—1 ♀; before 8.0—3 ♂ 3 ♀; about 8.0—2 ♂ 3 ♀. With these, many pupae and two larvae in spirit taken at Agege with the pupae from which the imagines emerged; also Termites of three different genera (see p. 416) from the Termitarium in disused parts of which the *Camponotus* had made its nest. Also, from Moor Plantation, 3 ♀ imagines of *C. phasma*, ovipositing on flowers of *Solenostemon*, Aug. 5, 1918, and (two on the same plant), Aug. 11.

The discovery of the pupae in the *Camponotus* nest was at once brought before the Entomological Society (Proceedings, 1917, p. lxi, and 1918, p. lxxix, where the first determination of the Lycaenid as *parsimon* F. was corrected to *phasma* Butl.

The male armature of the *Catochrysops* has been examined by Dr. T. A. Chapman, F.R.S., and Mr. Bethune-Baker, who agree that the species is certainly *phasma* Butl. For a description of the larva and pupa by Dr. Chapman see pp. 490-93.]

Government Farm, Agege.

Sept. 10, 1917.—I have had a glorious find to-day. I set some men to clear the site of new labourers' lines. I went to see the progress of the work just as they were levelling what I took to be an old ant-hill (Termitary). The species of Termite is one that fastens on to large bush [forest] stumps and gradually converts them into a carton and mud heap, mainly carton, unlike *T. bellicosus* Smeathm., our commonest form, whose hill is entirely of clay. The colony was a feeble one, the material, I suppose, being more or less exhausted. But what I just arrived in time to see was, that in the abandoned carton portion *Camponotus maculatus* had established themselves. A fork thrust had just fetched out a mass of the nest, and amongst the débris I saw a number of pale-brown pupae, obviously Lepidopterous. I must make it clear that this fork-thrust went well below the ground-level, so that these pupae—and I found many more *in situ* in the mass—were actually subterranean, and they are Lycaenid pupae. I have seen the butterfly, for two or three emerged on the spot, a large blue form with spotted undersides and slight tails. The pupae were moth-pupa-like in colour, though rather pale or straw-coloured. I haven't counted, but I think I must have thirty of them, and not a few were accidentally destroyed. They all look as if they would emerge together. And I found two larvae about to pupate! They are of almost wasp-grub appearance, their legs and pro-legs being greatly reduced. I don't think they have either gland or tubercles. They had obviously stopped feeding, and it was useless to try them on the only likely-looking stuff there was, and that was Termite "bread." The nest had to be destroyed—it was ruined really before I arrived—but I think I'll be able to find others.

Do you remember that at Ibadan I once found a brown moth-pupa-like form associated apparently with *Camponotus maculatus* [p. 388]? I rather think you made it out as a somewhat abnormal form of *Lachnocnema bibulus*.

The huge soldiers of *C. maculatus* eagerly seized both pupae and larvae and carried them into concealment in the carton intricacies. I hope I may solve their food, but it may well be that they can tackle fungus growths on abandoned Termite bread left in the galleries. What strikes me as rather extraordinary is that this strange habitat would appear to be a safe one, for I'm sure there were in all fifty pupae, if I could have got them all, and the larva is soft-bodied with but few bristles. Now I will have to let this foreword do. I hope I'll get a good number successfully bred out. I ought to be able to send you the first lot next mail.

Agege.

Sept. 16, 1917.—My find might have been more complete, for I doubt if my first surmise as to the food of the larva is correct. On the whole I think it must be ruled out, but I may manage to get another nest of the kind sooner or later. It is something gained to know where to look. *The* nest was ruined before I came on the scene, and the wonder is I managed to get the material I did. It is all due to the fact that the present labourers' lines here are in the last stage of dilapidation and I determined to have new ones made. I got a new site selected which wanted some levelling. This I set the men to do. One has to be possessed of considerable versatility in a country such as this. I have done many strange jobs this tour, few at my own work. One can't leave the simplest bit of work to chance and a native headman, so after a time I went to see how the work was getting on and arrived in time to see two men driving forks into an old Termitary, part of which was already levelled. Little colonies of Termites with their fungus garden lay in the débris, and running about in great agitation were a large number of workers and soldiers of *Camponotus maculatus*. But what startled me more than these quite usual things was to see scattered about a number of golden-brown or straw-coloured pupae, which at first I concluded must be moth pupae. I concluded mentally that they might be worth having were it only for a seemingly gregarious pupation in rather an odd place. Then, perhaps because just a few minutes earlier

I had noticed a fairly large Lycaenid flying around, it suddenly entered my mind for no considered reason, I must confess, that they were Lycaenids. It was simply an inspiration. Almost simultaneously I saw the agitated *Camponotus* endeavouring to carry them to safety, and further I saw a newly emerged Lycaenid appear from, well nowhere, but I felt sure it was one of them. I saw another and I think a third as I hastened off to get tins, and warned off all labourers from the scene on pain of execution. I didn't get any of the butterflies and not a few of the pupae were badly damaged, but, with the exception of perhaps half a dozen or more that were hopelessly smashed, I took them all in and afterwards found I had brought in forty-one in all! I'm certain there weren't less than fifty pupae in that nest. I could do nothing to restore it and could only search the ruins cautiously for survivors of the wreck. I had great difficulty in separating the ants from the pupae. Two I discovered really by means of the ants. I saw two worker *Camponotus* trying to penetrate into the loose earth. There was no visible opening, but I thought there might be one beneath, and cautiously cleared away the particles of soil. About half an inch below I came on the two pupae. The ants rushed at them and proceeded to extricate them. I appropriated the lot. But I must go back a bit. The Termitary was of the carton type, part of it old and abandoned, and I am pretty certain had become secondarily tenanted by the *Camponotus*, though I couldn't definitely find the centre of the nest. There were neither larvae nor pupae of the *Camponotus*, only workers and the huge soldiers. But I abstracted a large mass of the carton nest and on it put a few pupae. Ants already occupied the carton material. The pupae were immediately seized and carried out of sight into the mass. I searched most carefully for Lycaenid larvae and found two, in loose soil. These also were eagerly carried inside the carton mass. The larvae were apparently replete and resting, prior to pupation. I could detect no glands nor tubercles, though, now they are in spirit, there is evident a slightly pigmented prominence in the region of the Guenée gland. The larvae are, to say the least of it, very grub-like, which is accentuated by their meagre pigmentation. The only colour was a faint pink, so faint as to be almost white. Where they may have been located in the original nest I cannot say. I think it most

probable that it was in the carton mass. It is a pity that the nest was smashed, but the only consolation is that had it not been smashed I shouldn't have found them. Any future ant-hill smashing that I do will be done most cautiously. Since then I have probed about half a dozen similar ones, but only to find, besides the Termites, colonies of *Odontomachus haematodes*. But, after all, one can hardly expect such finds every day of the week, and I had to wait a long time for *Teratoneura*!

When the ants carried off the pupæ and larvae I carefully broke off bits of the carton to see what they had done with them all. I had "allowed" them about half a dozen pupæ. I found them all carefully massed together round a dried-out bit of Termite "bread." This led me at first to suggest that as the food of the larva, but on thinking it over I rather doubt it. I am more inclined to think, after looking at the extremely small heads of the larvae, that they are fed by the ants, unless the entire absence of ant larvae be accounted for by the Lycaenids having devoured their ova. That also I doubt. The larvae with glands, as far as I have seen, and I think Lamborn's results show the same, are generally phytophagous, anthophagous or suck sugary secretions. *Camponotus maculatus* I do not think is ever carnivorous, but haunts flowers in search of nectaries, leaf-glands and such-like, and has a perfectly distressing "scent" for one's sugar stores. It is quite likely that they innocently feed the Lycaenids by the ordinary process of regurgitation, and the Lycaenid perhaps does redeem itself from the slur of parasitism by a little return through the medium of the Guenée gland. An examination of the contents of the alimentary canal might throw some light on the subject (see p. 492).

Agege.

Sept. 17, 1917.—Seven emerged to-day or rather eight, the eighth being malformed. I have been most unlucky with malformations, having now about half a dozen. Several more pupæ have simply blackened and perished, but till now I have fourteen practically perfect specimens, and I may with luck finish up with two dozen. It is very sad to lose so many, but I'm afraid it couldn't be helped. Anyhow, I don't suppose, since Lamborn's wonderful *Euliphyra* case [Trans. Ent. Soc., 1913, p. 450], so many butterflies have been bred out of a nest of ants. And of

course my find was a pure accident, and ought not to be mentioned along with such a wonderful bit of deliberate searching and finding as Lamborn's was. And of course if it hadn't been for Lamborn, the happy issue of this particular accident would have been lost. So I gladly dedicate them to my friend.

I mentioned that I allowed the ants to carry pupae into the concealment of the carton labyrinth, from which I afterwards abstracted most of them. A few I left in the hope that I might see how the ants behaved subsequently. I wondered if they assisted the imagos (or should I say imagines?) to emerge. Unfortunately I have quite a lot of other work to do, and in my absence two or three came out. I got back in time to rescue one which was caught by a leg by a worker ant. What I took to be the disintegrated remains of two I discovered under the carton mass, but they may have been devoured by the white ants which still were present. Later on another got caught by an ant and had to be rescued, and, as I really couldn't get the time to look after them continuously enough to make useful observations, I was forced to separate them entirely from the ants. Yet in nature these newly emerged butterflies would have to run the gauntlet of not a few easily excited and suspicious ants, and I am greatly disappointed at not being able to throw any light on the problem. I can only hope that I may one day see a newly emerged *Lycaenid* crawling out of the opening of a *maculatus* nest. There will be no scope for "profane" labourers with forks. Escape may be facilitated by the fact that *maculatus* is, as I think I told you [pp. 423-25], of nocturnal habits.

Agege.

Sept. 18, 1917.—Five perfect and one malformed emerged to-day, which brings my total of good specimens up to nineteen. With anything like good luck I ought to manage two dozen and perhaps one or two more. I have to go to Lagos to-morrow and will be there two days. However, I'll take them with me. I am putting up at the Medical Research Institute, where they will be looked after while I carry out the purpose of my visit, which isn't a very exciting one and is on the whole a most irksome one.

Agege.

Sept. 27, 1917.—The mail is announced for to-day. The train service is suspended owing to floods, but I am sending

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a boy to Lagos with this and a box with a few of the great find. I am so pressed for time that I had to take a few at random from the box. I will send the rest in small lots so that they may not all be torpedoed at one Hun effort. I have also sent one larva and one tube with Termites.

Agege.

Oct. 18, 1917.—I will now give you a few notes of the things I have posted for this mail. To begin with I have sent a second batch of the *maculatus*-Lycaenid with pupae-cases. The boat they will go by is an old and none too speedy one, but one that has had the most wonderful submarine adventures and got through. On one occasion she fought the enemy for six hours, was missed by four torpedoes and sank the enemy. That is no romance—except in the best sense. So I am in hopes that you will get my Lycaenids.

Agege.

Oct. 20, 1917.—I hear the R.M.S. "Mandingo" (originally "Appám") has got home, and on it were the first of the *maculatus*-Lycaenids.

Moor Plantation.

Jan. 26, 1918.—[After describing the final consignment of *C. phasma*.] Then you got some pupae in spirit which failed to emerge, so you may now total up the lot. And I think you may safely allow ten more for unfortunates that were squashed in digging out the ant-nest, besides the two larvae, and you will know the wonderful total.

Jan. 12, 1918.—A mail arrived here yesterday which brought me a proof copy of the foreword (Proc. Ent. Soc., 1917, p. lxi), and also the news that the *Catochrysops* may not after all be "*parsimon*." I hope its real name will be worthy of such an enterprising animal.

April 17, 1918.—*Catochrysops phasma* rather pleases me—much better than "*parsimon*," a dreadful combination of indifferently classical Latin and neglect of observation [see also p. 325].

Aug. 11, 1918.—What with adding up yards of wretched money columns I was in doubt if I could catch the next steamer home. So heartily sick of the work was I that my whole outlook was one of unredeemed pessimism, but the other day something happened which made me wish for another month here at the risk of missing September in

Scotland. I have a milch goat, a somewhat perverse animal. One afternoon it cried so very persistently that I went outside to see what could be wrong. I could find no evidence of anything but perversity, and was really feeling most annoyed, when I suddenly saw a *Catochrysops*-like Lycaenid deliberately oviposit (I felt quite sure about it) on a weed in my compound—a *Labiata*! [*Solenostemon ocymoides* Schum. and Thonn.] The plant is the one from which Lamborn bred *Precis octavia*. It is an almost scentless plant. I knew of *Ocimum viride*, the so-called mosquito-plant, and had looked at it for Lycaenid ova, but without success. *O. viride* is a W. African plant (it yields thymol) the scent of which was supposed to be a mosquitifuge. It is commonly found in native villages. It doesn't seem to have entered the minds of those who boomed this plant as a terror to the mosquito, that the absence of mosquitoes from villages where the plant grew (if indeed they are ever absent) might equally well be due to the normal so-called "bouquet d'Afrique," which at times takes forms that might knock out the stoutest mosquito.

I do not know if the Lycaenid I've got is *phasma*, for I have kept no type. [It is *phasma*.] Anyhow it is just as well, for it gives me no bias. The egg is most cunningly placed inside the small flower on the lower lip of the corolla. For a Lycaenid egg it is quite large and of a pale blue colour. I have just looked at the first set of inflorescences on which the specimen caught on the 5th (it was Bank Holiday) oviposited. I only found two ova and those with difficulty, for the swollen nectaries, which secrete at a great rate even when the flower is cut, are rather like the ova, and I think I must have overlooked some, for I now find there are about half a dozen unmistakably Lycaenid larvae, tiny little things and rather bristly, one of a yellowish colour, the others red-purple like the flowers. I wonder if I'll be able to do anything with them before I have to sail. Of course they may not be *phasma*, but I think, if the Lycaenid completed its whole existence on the plant, that Lamborn would have found them. Plants are difficult to dry at this time of the year, but I'll send a specimen in spirit for you to send to Kew. I am also to send the *Loranthus*. [Both sent on the following day, Aug. 12.]

[Dr. O. Stapf of Kew informs me that *Solenostemon ocymoides* ranges from Senegal to the Congo. It is very

closely allied to *Coleus*, the recognised food-plant of *Precis*, so it is not surprising that Mr. W. A. Lamborn should have found the larvae of *P. octavia* upon it (p. 399).]

It is in a way rather unlucky that I should have to go home, but it will be about a month before the next boat goes, and I may have some luck in the interval. Anyhow, if the wretched Boche doesn't get me it will be a nice problem to come back to, and if the aforesaid Boche does get me, perhaps Lamborn will supply the missing link. I think the fact of the oviposition being *on the flowers* is significant. *Camponotus maculatus* is a notorious nuisance in sugar cases. They are always crawling about flowers, and I think it likely that the food of the *phasma* larvae in the *Camponotus* nest must be regurgitated nectar. Of course they might turn carnivorous at the next stage, but I've little doubt that, given a chance, I ought to be able to clear it all up. It is only a matter of time.

Aug. 25, 1918.—I told you about finding the Lycaenid (possibly *Catochrysops*) ovipositing on a Labiate plant. I now have a lot of young larvae, but they will not be mature before I sail. However, I am to ask Dr. Connal to follow up their life-history, if it can be followed. In trying to find fresh food for the larvae I have had difficulty in finding plants *without* tiny larvae already feeding on them, and the butterfly, whatever it is, is busy all over some of our more weedy plots. I have of course but a somewhat dim recollection of *phasma*, and more than probably I am on another butterfly altogether, for two larvae have pupated! So far I have only seen one type of butterfly (those sent to you) ovipositing, but somehow the pupae seem to be too small for that type. I have been able to provide abundant "chop" for the larvae, and the pupae cannot be small on that account. But the larvae are very variable in colour. If the inflorescence on which they feed is rather young and predominantly green, the larvae are green and red. If the inflorescence is predominantly reddish-purple, with mature, fully opened flowers, the larvae are reddish-pink, and when very young, extremely difficult to pick out among the tiny hairy flower-stalks which they closely resemble. Those that pupated were mostly green, with hints of red round the margin, but they "went up" on a green leaf. The pupae are distinctly bristly too. I wish I could have stayed another month, but it is no use trying to get it. They'd think I was funking

the sea, which I do in a way, but not enough to reduce me to make them think I felt like that. However, it is quite likely that the plant grows in East Africa and maybe *phasma* is there too, or whatever form I've got, and Lamborn will know the host-plant of *Precis octavia*. He will be able to clear it up if I never get another chance.

Lagos.

Aug. 31, 1918.—I sail to-morrow morning. Two days ago, or rather a day or two before that, I had decided that I had two sets of larvae on the Labiate, one green or reddish or both together, of which four pupated. Two of these have emerged, and they are a small and very pretty form. The other set are reddish *only* right through, but have grown very slowly. They are by far the most common. In fact, every plant one picks carries a few. None have pupated, and I begin to think they won't. Some have died of a fungus disease (in one only of my tins), but one of the other type also died.

I sail to-morrow morning, but I am to see Dr. Connal this afternoon and he will be able to tell you the sequel. It is very bad luck that I should have to go just now, but it can't be helped. I feel sure that they are *phasma*. I actually found a *maculatus* which had got caught by a spider on one of the host-plants, but it was dead. The worst of it is that the *Camponotus* is a "night hawk," and one seldom sees them at all in the day.

Now I must close. I do hope I'll get the chance to complete the life-history myself on my return.

Yours sincerely,

C. O. FARQUHARSON.

[These were the last words I received from my friend. There can be no doubt that the larger larvae were *C. phasma* and that they are carried by the ant to its nest to complete their development. The imagos of the smaller Lycaenid, which lives throughout larval life on the food-plant, were probably taken on the "Burutu" and lost. I have tried but failed to receive any communication from Dr. Connal concerning the material left with him by Mr. Farquharson. It is probable that the smaller Lycaenid larvae possess the power of individual adjustment to the changing colours of their food-plant, in this respect resembling those of *Lycaenesthes lunulata* (p. 386).]

III. MISCELLANEOUS OBSERVATIONS ON RHOPALOCERA.

A. NOTES ON BREEDING CERTAIN NYMPHALINAE.

1. *Charaxes theocles* Cr.—[An account of the series of specimens, with male-like females, bred by C. O. Farquharson and W. A. Lamborn, has been published in Proc. Ent. Soc., 1918, p. lxxxiii.]

Oct. 16, 1915.—The larvae were obtained from the same plot of *Adenantha pavonina* at Moor Plantation. I have rarely seen more than one or two at a time.

July 26, 1915.—I have five *Charaxes* pupae just now, but this will be the last for a time, for the young trees on which they feed are being transplanted. These trees also one day were raided by drivers. The place is simply alive with them just now owing to the dull weather.

2. *Charaxes varanes vologeses* Mab.—[The bred specimens referred to below are a male, emerging June 22, 1917, and a female which pupated June 12.]

Oct. 18, 1917.—I had rather a bit of bad luck over them, for I chased the mother all over a ten-acre field of ground-beans between the burning hours of 11 and 12 noon, only to lose her. I raised three from the eggs I saw her lay before I got home for my net. However, I may have better luck next time.

3. *Palla violinitens* Crowley.—[The following note, written from Kew, almost certainly refers to a female of this species labelled with Farquharson's initials, but no other data. Its position in the Moor Plantation collection proves that it was bred or collected in 1913 or 1914.]

Oct. 20, 1914.—I bred out a very nice *Charaxes* before leaving, or rather it was a pupa when I left and a friend sent it on. I do not know the name of the host-plant, which had at the time neither flower nor fruit, but may know it again. The larva had purple blotches on the skin.

4. *Euphaedra ravola* Hew.—[Of the bred specimens referred to, 1 ♂ emerged Aug. 22, 1915; 1 ♂ 5 ♀—7.0 a.m. Aug. 23; 1 ♀—Aug. 24. All have precise pupa-cases. Six families of this species were bred by W. A. Lamborn at Oni and the resemblances between their larvae and those of several other Nymphalines recorded in Proc. Ent. Soc., 1912, p. cxix.]

Sept. 28, 1915.—The Euphaedras were found as larvae in a company on their host-plant. They were a curious chocolate-brown colour with processes like those of *Hamamumida* or *Aterica* of a vivid sulphur-yellow colour, which gave them rather a fearsome look.

5. *Harna (Cymothoe) theobene* Dbl.—Hew.—[The material, bred in 1915, includes 3 ♂ emerging Aug. 1, 9, 11; 2 *nigrolutescens* ♀ forms (p. 469)—Aug. 4, 21; 2 *theobene* ♀ forms—Aug. 10, 11. The ♂ and ♀ of Aug. 1 and 4 pupated July 22 and 26, respectively. All except the ♀ of Aug. 21 have precise pupa-cases. For an account of the ♀ polymorphism of this species and Lamborn's families from known female parents see pp. 469–72.]

Sept. 28, 1915.—I am most interested in what I think must be a *Cymothoe*. The caterpillars were all found on the same host-plant in the bush, and were all identical. There would appear to be three imaginal forms.

6. *Neptis nemetes* Hew.—[Two specimens with precise pupa-cases were sent, bred from larvae found on the same plant in the bush:—1 ♀, emerging 1.0 p.m., Aug. 11, 1915; 1 ♂—Aug. 12. The ♀ pupated Aug. 1.]

7. *Acraea lycoa* Godt. and *A. pentapolis* Ward.—[A bred series of *lycoa*, 2 ♂ 4 ♀, emerging Aug. 22, 1915; 2 ♂—Aug. 24 and 25, these two latter with precise pupa-cases. One ♀ *pentapolis*, emerging Oct. 2, 1917, from a pupa found at Agege.]

B. THE UNDER SURFACE OF THE NYMPHALINE BUTTERFLY *CRENIS AMULIA* CR.

[The following letter was written from Kew. Two specimens are labelled "Aro-Chuku 13.v.14," the third, undated, "E. Prov. of S. Nigeria. Bonny, Aba, Aro-Chuku, Azumini. Butterfly showing *Hamamumida*-like variation." The resemblance to a common form of the variable under-surface of *Hamamumida daedalus* F. is certainly strong, and it is probable that Farquharson was suggesting mimicry of the abundant by the rarer species. It must, however, be remembered that *daedalus* could only act as a model during the daylight hours of complete rest. In the intervals of the active state it invariably rests with expanded wings, as Farquharson well knew (Proc. Ent. Soc., 1914, p. xxxix).]

Oct. 26, 1914.—I am sending three butterflies—not in good condition, I regret to say, and to be effective I ought

to have had more. They seemed to me as I watched them in passing through the districts where I saw them, to show under-surface variation recalling that of *Hamanumida daclabus* very markedly. Perhaps this feature of this particular species is well known to you, but I am not sure whether I have heard Dr. Lamborn mention them.

C. THE MIGRATION OF LIBYTHEA LABDACA WESTW.,
AT MOOR PLANTATION.

[For further observations on the migration of this butterfly in W. Africa see Proc. Ent. Soc. Lond., 1916, p. iv; for that of *L. laius* Trim., in B.E. Africa, *ibid.*, 1912, p. xcvii; 1921, Swynnerton, p. lxii; and of *L. bachmanni* Kirtland, in Texas, Ent. News, Oct., 1917, and E.M.M., 1918, p. 16. I wrote to Farquharson about the inconsistency in the direction of flight in his letter of May 3, 1917, but this was one of the subjects he had left to discuss during his leave. Fortunately, however, his letter to Dr. Hill leaves no doubt about the interpretation.]

March 20, 1915.—It has been dry since I came out till within a few days ago.

To-day the migration of the Libytheas has been in progress for more than two hours now. A constant stream of them has been flying across the station in a S.S. Westerly direction. I have now seen this migration three times, and each time it has been in the same direction. I am not sure if the seasons have corresponded, but I rather think that is so. The particular species is not very common here ordinarily, if anything they are uncommon. I have only seen them a common species in one place, at Aro-Chuku in the Cross River district, near Itu, which is N. from Calabar.

May 3, 1917.—The northward [southward] flight of the Libytheines took place yesterday and the day before. In some places the natives take the appearance of the migrants as a sign that the planting season for such crops as maize and other annuals has begun, which is equivalent to saying that the rains have definitely set in. They go southwards [northward] again at the end of the season. This year the flight is late, for I recall that when I laid down the ground-nut experiment which led to the discovery of the Mylabrids, about mid-April, the flight was then in progress.

It is curious that these inconspicuous almost cryptic

forms have the queer habit of settling in great numbers on white-washed culverts, white stones and such things, where they are most prominent. [See Swynnerton in Proc. Ent. Soc., 1921, p. lxiii, for evidence that *Libythea* seeks some chemical substance.]

[Mr. Lamborn agrees with me that there can be no doubt that "southward" and "northward" were accidentally transposed in the above letter. As the passage stands it is inconsistent with the letter of March 20, 1915, and also with the following, written by Farquharson Aug. 23, 1918, to Dr. A. W. Hill, F.R.S., and published in Roy. Bot. Gard. Kew, Bull. No. 10, 1918, pp. 355, 356.]

"Early in the rains for two or three days thousands of migrating Libytheine butterflies pass here flying southwards. The negro peasant knows that after that he may safely sow his cereal crops—maize, at any rate. Towards the end of the rains swarms of the same butterflies return northwards. One may conclude that the rains are over. Between the flights to and from the forest belt we never see them."

D. A LYCAENID FALSE-HEAD-LIKE APPEARANCE PRODUCED BY TWO PIERINES IN COITÚ.

[The attitude described was roughly illustrated in the following letter, but it is somewhat difficult to understand. In order that the antennae of the butterfly enclosed between the wings of the other should alone be visible it is necessary to assume that the abdomens are sharply bent into an S.]

Aug. 11, 1918.—I read with special interest that theory about the false "head" of Lycaenid butterflies. I hope you will not imagine that I was wise after the event, but the theory brought to my mind a curious error into which I fell a day or two earlier. On a plant in my garden I saw what I thought was rather a large white Lycaenid that I'd never seen before. With the exception of things like *Catochrysops*, few Lycaenids come up to the clearings round our quarters, most of them preferring the bush near the river. I was quite surprised at such a fine large one with rather long tails. Having no net I put out my hand to grasp it, but "it" flew away. "It" was really two moderate-sized Pierines *in coitú*, which had settled down on the plant. I wish I could draw their position, but you

will perhaps realise how things were from my rough sketch, [showing the] antennae of the second one [projecting behind like tails], the wings being quite invisible, enclosed by the wings of the first. When they took to flight the illusion was, of course, obvious, but when they were at rest, and I was not looking for anything in particular, I was completely taken in. I was so surprised that I hardly noticed which of the Pierines it was, but I shall more than probably see the same thing again. The memory of the incident, however, made me read the false-head theory with great respect.

E. A REMARKABLE LARVA, PROBABLY PAPHIIONINE.

Mar. 2, 1918.—One evening about a fortnight ago I was looking at the small fruits of a tree growing by the river side which I had been told were edible. The tree is, I believe, a Sapotaceous one, of the genus *Pachystela*. I noticed a very subtly cryptic larva, of a dry earth-brown colour, resembling a dried-up catkin more than anything else. Its attitude, with head and front thoracic region lifted, so that the larva stood on its pro-legs, made it rather moth-like, especially as it had rather a long gap between the last pro-legs and the clasper hind "feet," and this posterior region was also held up. I took it in and it fed readily. Its frass was rather characteristic, consisting of fairly large pellets, hollowed out so that when dry they looked like small air-gun lead caps or pellets. At the next moult the larva was more remarkably coloured. It had clubbed spiny processes on it even when first I saw it, and these became more pronounced, but the colour changed to a wonderful mottling of green and brown with little hints of red. You may be sure I was glad to see it pupate to a swallow-tail type of pupa, but the next day the pale green pupa turned black and shrunk and is, I think, parasitised. What is worse, I cannot find any more, but the tree is fairly common and I may, unless its season is just over.

F. THE HESPERID RHOPALOCAMPTA FORESTAN CR., PROBABLY ABSORBING SALT.

[The following note, additional to those published in Proc. Ent. Soc., Lond., 1916, p. lxxx; 1917, p. lxxviii, is quoted from one of Farquharson's letters.]

Government Farm, Agege.

Dec. 15, 1916.—I have since seen *Rhopalocampa* doing the same on the cement floor of the office verandah. I didn't notice any spots [of perspiration] at the time. The chair, on the arm of which I saw the butterfly [Proc. Ent. Soc. Lond., 1916, p. lxxxii] was an old one. It is possible that the surface, from one's habit of involuntarily perspiring in this country, might be rather saline, but I'll try to get further observations. My first one was lucky, for the action was so prolonged. I had no difficulty whatever in seeing what was taking place.

IV. MISCELLANEOUS OBSERVATIONS ON HETEROCERA.

1. *Elaeodes brevicornis* Walk.: *Noctuidae*, *Acronyctinae* (*Diphtherinae*).—[The material of the following note includes 2 ♀, emerging about 5.0 p.m. and after 6.0, Mar. 18, 1917; 3 ♂ 2 ♀ (with cocoons)—Mar. 19; 2 ♂ 1 ♀—Mar. 20. The next species *E. acatharta* Hmps., in the British Museum collection, is accompanied by pupa-cases and preserved larvae. The larvae appear to be even more conspicuous than those of *brevicornis*, but the pupae less so. The cocoons of both species are very slight so that the pupae are visible.]

Mar. 18, 1917.—Two of the fern-feeding moths have emerged to-day, one about 5 p.m., the other after six. I can't say the exact time as I was out when the second came. It is rather a pretty moth. The larva was about an inch and a half long, of somewhat "loud" pattern, being striped dark brown, almost black, and yellowish white, with translucent brown, ventral surface. In spite of their rather formidable appearance they were rather timid, and dropped to the ground when disturbed. The body had very sparse hairs. I took a dozen larvae—as many as I could reach—all of which pupated in the next two days. They bound one or two of the fern pinnae together with silk threads, but not by any means elaborately. The pupa itself is rather a bizarre, brown-and-yellow-coloured object. I collected them because it struck me I had not seen many larvae—Lepidopterous at any rate—feeding on vascular Cryptogams, but it may be quite common.

2. *Eublemma scitula* Ramb.: *Noctuidae*, *Erastrinae*.—

[Two examples bred May 14, 1917, from larvae feeding on *Aleurodes africanus* Newst. (p. 528) on the under surface of leaves of *Salacia* sp. (*Celastraceae*), in Farquharson's compound. The plant, which Farquharson thought to be *Anona muricata* L., was determined by Mr. T. A. Sprague of Kew.]

3. *Selepa leucogonia* Hmps. : *Noctuidae*, *Sarothripinae*.—Two examples, one bred Nov. 1, 1917, the other probably in the same month, from larvae feeding on Wine Palm Scale.

4. *Bareia incedens* Walk. : *Noctuidae*.—One moth "bred from fairly large, pale green larva, found Feb. 21, 1917 (spun Feb. 22), on leaves of Lycacid tree," *Alstonia congensis*.

5. *Two remarkable Larvae, Geometrid (Hemitheinae) and Notodontid (Stauropus)*.—[Both were received in alcohol. The extraordinary Geometrid larva is described and figured by Dr. Eltringham (p. 487). The Notodont larva is evidently allied to our *Stauropus fagi* L., and the mimetic resemblance is of the same kind, although carried further in that the posterior part of the larva, being coloured green, represents the prey and the anterior part, the ant attacking it. The remark of the "boy" supplies interesting confirmation. In the later stages of *fagi* Portschiniski suggests that the caudal shield represents a Pentatomid bug, and the rest of the caterpillar its victim ("Coloration marquante et Taches ocellées," V. : St. Petersburg, 1897, pp. 44 et seqq.). For the ant-like appearance of the young *fagi* see Linn. Soc. Journ. Zool., vol. xxvi, 1898, pp. 589, 590, pl. 40, fig. 1. In Farquharson's specimen the head, true legs and anterior segments are black, like an ant, while the green colour begins abruptly with the 3rd abdominal and is continued backwards to the caudal shield, which, of a brownish tint, doubtless represents the head of the victim. The two long slender caudal filaments lie along the ventral surface of the shield. The 1st and 2nd abdominal segments bear a pair of long, sharp, backwardly curved processes, one on each side of the mid-dorsal line. They are beset with short, sharp spines.]

Agege.

Oct. 18, 1917.—Yesterday was a day of surprises. I found a looper larva that looked exactly like a small centipede, that is, it was dorso-ventrally flattened and had extraordinary processes along its sides, or rather developments

of the segments. It was not on its food-plant, and I think I will have to kill it without knowing what it is. Finally, my boy brought me a curiosity. It looked like an ant (a black one about the size of a *Camponotus* (*Orthonotomyrmex*) *sericeus* F.) in the act of engulfing, in a thoroughly un-ant-like way, a green caterpillar. "What on earth is this, Joe?" I asked. Said he, "I think some ant ketch 'um." Then I found it was all one animal. I remembered a picture in Shelford [lowest fig. on pl. xvi, facing p. 230 of "A Naturalist in Borneo"], and to-day I found in Lefroy's "Indian Insect Life," p. 472, a picture of a Notodontid larva [*Stauropus alternus*] which, I think, must be of the same genus. Looked at closely, of course, it isn't a bit like an ant, but more than likely it is the first impression that is the saving impression. The enemy in nature is not going round with a Zeiss pocket lens magnifying so many diameters.

6. *Ereunetia fulgida* Warr. : *Geometridae*, *Boarmiinae*.— [Mr. L. B. Prout considers that Warren's *flava* and *curvifera* are synonyms and his own *orientalis* a geographical race of *fulgida*. A single male was captured, attracted to a lamp, July 12, 1918. Farquharson noted that, in the resting position, the wings are held upright over the back, as in many Geometers. Farquharson was here doubtless referring to the brief rests between the flights—not to the position assumed in prolonged rest. This moth is an interesting addition to the great group mimetic of Lycid beetles (Trans. Ent. Soc., 1902, pp. 515-18; Proc., 1918, pp. cxxxviii-cxlii.)]

7. *Parasa viridissima* Holl. : *Limacodidae*.— [Two moths bred Dec. 19 and 20, 1917, from larvae feeding on Coconut Palm at Awka, 22 miles E. of Onitsha.]

8. *Margaronia prasinophila* Hmps. : *Pyralidae*, *Pyraustinae*.— [The following note by Farquharson, together with the ♂ Pyrale (both numbered 477), was sent to me by W. A. Lamborn.]

Feb. 4, 1914.—On entering my house the other day, Jan. 29, 1914, I observed a pale green Pyralid moth on the wall of my room. This was about mid-day, and the moth was in a position of rest. On my approaching for a nearer view the moth moved slightly, evidently in alarm, though without attempting to take to flight. At the same time, too, from its posterior end a tuft of dark hairs was exerted, and the tip of the abdomen rotated rhythmically from side to side, the hairs remaining extruded all the while.

I captured the moth by putting a glass over it, and put it on a side table where I could observe it more conveniently.

During this operation the moth was of course violently agitated and fluttered about inside the glass, ultimately, however, settling down. From a position which I judged to be invisible to the moth I observed that the rotation of the abdomen with its extruded tufts continued for some time before the normal position of quiet rest was assumed.

By disturbing the moth inside the confined space of the glass, I tried to discover whether any odour was emitted, but unsuccessfully. I do not, however, lay stress on this, as my olfactory sense may have been at fault.

9. *Mnemoses farquharsoni* Durrant, *gen. et sp. n.* (p. 494): *Tineina, Hyponomeutidae*.—[Material:—Fifteen moths, with precise pupa-cases, 2 bred Oct. 2, 1917; 12 (3 in British Museum)—Sept. 23–Oct. 11, 1917; 1—Jan. 17, 1918, from larvae in silk web as described below. Also 3 webs, and examples of larvae in spirit. From the bark of Pará Rubber, *Hevea brasiliensis* Müll. Arg. (Euphorbiaceae), at Agege. None of the parasites mentioned were received.]

Agege.

Sept. 27, 1917.—I have also sent two little moths labelled Pará Bark Moth of which I will write you later. I regret to say I took the larvae for Coleopterous specimens, but they spin a protecting web like Embiids except that they dust it over with fine sawdust. They live on the outer cortex and are quite harmless, only all Pará trees crawl with *Oecophylla*—or bristle with them I think would be a better term—which are constantly running up and down, over the “webs,” so that, in a way, this little moth gets over *Oecophylla*.

Agege.

Oct. 18, 1917.—I also sent some more specimens of the Pará Rubber bark-feeding moth. I hope some of them will get home with sufficient scales on them for diagnosis. I tried folding back the wings and failed utterly. The other way could hardly be more ruinous, but I will have a further try. I fear I suffered from nerves. With the specimens I sent a piece of the extraordinary web they weave. For such tiny moths, their achievements in this way are rather remarkable. The Pará tree from which that substantial piece came was covered nearly all round for 3 or 4 feet

of its length, from about 5 feet from the ground upwards, and the circumference of the stem would not be less than 25 or 30 inches. For the most part the web is of single texture, but the larvae appear to pupate gregariously, and over the place selected for pupation the web is several layers thick and each pupa is immediately surrounded by a very tough piece of the fabric. I have bred out quite a number and found no parasites. I may say, too, that Pará trees here are almost without exception infested with *Oecophylla*, and I am sure give rise to much "bad" Yoruba among the tappers. *Oecophylla* is a most unreasonable animal, hardly ever waiting to be attacked. Unconsciously I should think they do much to protect these little moths, for they run freely over the protecting fabric and few other things share their hunting-grounds. How the little moth gets out is a question I cannot answer. The first larvae I found were under rather an old dilapidated fabric, and I thought they were some sort of Coleopterous type. I ought perhaps to add that there are normally on Pará trees brown patches of bark, free from lichen, which are difficult to tell at a distance from the web of these moths—really difficult to tell.

Moor Plantation.

Jan. 8, 1918.—During the week-end I was at Agege. I had to go down and pay the men, besides checking two months' rubber yield, so that, as I only got down on Saturday—6 hours in the train—and back here yesterday, I had to work most of Sunday. I managed, however, to secure some excellent specimens of the Pará moth web, which I will send next mail. I can't get time—indeed, haven't quite enough material—to send this mail. I also got cocoons of a Hymenopterous parasite, but so many are hyperparasitised that I doubt if I'll get a specimen of the original. I saw quite a dozen tiny Chalcids or Braconids on the surface of one web. I also found a few Dipterous puparia, but practically all parasitised. It is the larva that is attacked.

May 28, 1918.—While at Agege I had a hunt for the little Pará moth parasites. They are a Dipteran of some kind and an Ichneumon, but I couldn't find one that hadn't been parasitised in turn by a tiny Chalcid or Braconid. The latter I frequently found inside the "web." I am in hopes that I may yet get the original parasites, for the moth is very plentiful at present.

B. MISCELLANEOUS OBSERVATIONS ON INSECTS.

I. APTERA: COLLEMBOLA.

May 3, 1917.—P.S. again. If Lamborn is at Oxford I wonder if you'd ask him whether he ever did anything with curious very tiny blue-black wingless insects that appear at this season after the early rains. They are gregarious and occur in vast numbers, so that they look like a mass of bluish "soot" on the ground, or like a great splash of ink. They pass over the ground in a wave, sometimes many yards long. I have never seen what I consider would be the mature forms, but I must send you some. When you disturb the mass they rise and scatter, like a film of smoke—of course, only rising for an inch or two above the ground.

[Specimens collected by Mr. Lamborn at Moor Plantation (May 17, 1914) have been determined by Prof. G. H. Carpenter as *Isotomina 12-oculata* Carp., the species from Nyasaland referred to below. Prof. Carpenter has kindly written:—]

"April 27, 1921.—I think that you should certainly publish the note, as we have so little information about the bionomics of tropical Collembola. This habit of crowding together is, of course, well known with respect to many British and European species—such as *Podura aquatica* on the surface of ponds, *Anurida maritima* on tidal rock pools, and *Achorutes socialis* on Alpine snows. The species of *Isotomina* from Nyasaland, described in *Sci. Proc. R. Dubl. Soc.*, vol. xv (N.S.), No. 39, p. 513, must be a markedly social insect, as there were hundreds of specimens in the collection, and the same may be said of the antarctic *Gomphiocephalus hodgsoni*, which the naturalists of the second Scott expedition found in swarms on frozen pools and among snow in S. Victoria Land. (My paper on this is now in the press among the 'Terra Nova' reports.)"

II. NEUROPTERA.

A. EMBIIDAE.

Notes on Embia (Rhagadochir) apicata Silvestri, sp. n. (p. 449), and a larval *Embia* on Cotton-seed Sacks.

Material:—Two ♂, 2 ♀ from webs on the Pará Rubber trees at Agege; the ♂♂ bred at Moor Plantation and referred to as sent off in a letter of March 23, 1918, the ♀♀ sent from Agege, Oct. 1917. Webs of the same species from Agege, sent Feb. 8, 1918. Also 4 larval Embiids from webs on cotton-seed sacks at Moor Plantation and web-covered sacking from the same store, referred to in a letter of Aug. 12, 1918. Farquharson considered that these latter were distinct from the Agege species, but Prof. Silvestri thinks that they are probably the same (p. 450).]

Government Farm, Agege.

Dec. 15, 1916.—There are one or two species of Embiids about here. They are extraordinary. Their "reversible" gear must be most efficient, for they can run backwards or forwards equally easily and rapidly.

Agege.

Oct. 18, 1917.—I thought at the same time [as the observations on the moth larvae, p. 410] it might be worth while to note any other insects that share the Pará Rubber trees with *Oecophylla*. One variety I have long noticed and always intended to send. I hope to send some soon. These are Embiids. There are several trees here that are covered round and round their stems up to the forks (about 10 to 12 feet) with a glistening felt of silk, which gives them in a half light a curiously ghostly appearance. On closer inspection the web is seen to cover an extraordinary network of "tunnels" of much denser opaque fabric, but the insects do not confine their journeyings to these thicker-walled tunnels, but can easily be seen under the general covering web. I once saw a winged one, but lost it, and have never seen another; but I recollect still that the wings were of a blue-black colour and somewhat lustrous like those of some wasps. I am in hopes that I may get winged forms again, for the species, whatever it is, is quite common on the Rubber trees—*Oecophylla*

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notwithstanding. They are really most extraordinary creatures with a perfectly amazing faculty of running backwards or forwards at will. They prefer the normal way, however, and turn themselves with astonishing ease in little space. When they run forward the hind legs appear to be more or less passive. On such a tree as I have described there must be enormous numbers. I am not exaggerating. The silk has a peculiar, sort of moon-stone lustre, or might be compared to a vast snail-smear though composed of threads, and the "vanishing tree" effect is really quite striking.

Moor Plantation.

Dec. 12, 1917.—I have also sent one or two Embiids.

Jan. 26, 1918.—The Embiids feed on the dead cortex—possibly for the lichen—of Pará Rubber trees. I have a few with wings developing.

Feb. 8, 1918.—I send a box with Embiid silk. It is difficult to get a good specimen—it is so fine. You will see the frass in the silk, but the frass seems to be concentrated at certain centres where the silk is several layers thick, not unlike the thickened part of the little moth "mat." At these padded parts, too, the young seem to congregate. I will write a full description of some of the curious habits of the Embiids.

Feb. 14, 1918.—I hope to get some interesting things about the Embiids. I believe they show the beginnings of social life—more than the beginnings, in fact. The Embiids feed on the dead cortex of the rubber tree. There is no doubt about that either. And there must be hundreds on a single tree, all under a common silk covering. I don't exaggerate when I say that I have seen 10 or 15 feet of the bole of a rubber tree, not less than 30 to 35 inches in girth, covered round and round with the silk. *Oecophylla* can walk over it but cannot get into it. Under the general web are thickened, practically opaque silk tunnels that converge at large "junctions" where even the general web is several thicknesses. Under these thickened portions the insects, especially the young ones, seem to collect. The whole thing looks like a map of the tube railways, the lines being of thick opaque silk and the whole overlaid with a thin but impenetrable (to other insects) film of semi-transparent silk. The "lines" are not, I think, tubes but simply portions thickened for more effective

concealment, perhaps in the daytime. There are lots of points to clear up, but every time I go to Agege I'll get a little more study put in.

March 2, 1918.—My Embiids haven't got their wings fully developed yet, so they are not sent. I hope they will get home all right.

March 23, 1918.—I have nothing to send this mail, for I have been very busy, but I've got a winged Embiid, the wings blue-black and slightly lustrous as I remembered seeing once a long time ago.

July 19, 1918.—I have found a most populous and prosperous species that lives in bags of cotton-seed, the tunnels and greater part of the web being on the outside. It will be as easy as possible to send you really great specimens. A British Cotton Growing Association's store near by, which is full of bags of cotton-seed, simply swarms with the insects. I haven't yet found out what they eat. I am to try to bring you home a live family. If I can get safely to a British port I will immediately post them to you, and perhaps if they were put in an incubator at about 80° they might live long enough for some one to study them fully. It is a different species from the Pará one, but the silk tunnels are exactly the same. I haven't seen any winged forms.

Aug. 12, 1918.—The other box contains a piece of sacking with typical Embiid silk galleries. There is also a small tube, with four of the Embiids. The species is much smaller than the Pará Rubber one. I hope to bring home some of them alive. So far no winged forms have appeared. I am not yet certain as to the nature of their food. Their galleries permeate the cotton-seed. I hope the specimen will not get rubbed more than can be helped. The specimen will give you an idea of what a Pará tree looks like when its bole for ten or fifteen feet up (and even well up the higher branches) is covered round and round with such a web. The Pará one's web is scarcely so dense, being as it were translucent, which gives the trees the "ghostly" appearance which I have already described. I do not think that I exaggerate when I say that there must be hundreds in a colony. In the cotton store hundreds of bags had splashes of white on them, and altogether there must have been thousands of the insects. The store had unfortunately to be emptied (the seed being distributed), but I've little doubt but that they will appear again next

season. The (Agege) Pará form I think certainly feeds on the dead outermost layer of the cortex. The frass is quite solid, in the form of round particles. The frass of the cotton species is very similar. I think there can be no doubt that the galleries are protective. As I told you, *Oecophylla* constantly run over the silk of the Pará form, making no attempt to penetrate it. They readily attack and kill individuals that one forces outside the web.

B. TERMITIDAE.

1. *Three Genera of Termites from a small part of a single Carton Nest at Agege.*

[Material:—A tube containing Termite soldiers and workers in spirit, from a "fresh bit of carton nest not as large as a football"—the nest (formed in a stump), in the disused parts of which *Camponotus maculatus* had established itself, and *Catochrysops phasma* pupae were found at Agege, on Sept. 10, 1917 (p. 392). Mr. Hugh Scott kindly examined the specimens and recognised the existence of three species among the soldiers. He then submitted the material to Prof. F. Silvestri who determined the species as *Ancistrotermes crucifer* Sjöstedt; *Hamitermes evuncifer* Silvestri; *Pericapritermes urgens* Silvestri, var. *nigeriana* Silvestri. Workers as well as soldiers of each species were present. Prof. Silvestri wrote March 22, 1920: "It is possible that all the specimens were found under a decayed trunk or in an earth nest of Termites, but I can assure you that each species has its own galleries. We do not as yet know any species of Termite living in the same gallery with another species, but it is very common for two or more species to be found in the same nest, as described in my paper on West African Termites." ("Contribuzione alla conoscenza dei Termitidi dell' Africa occidentale," Boll. lab. zool. Portici, ix (1914), pp. 20, 73, 135.)]

Sept. 18, 1917.—I am curious to know what the Termite is that figures in my *Camponotus maculatus* Lycaenid find (p. 392). They are of no direct connection, but you will see when I send you a few that I put in spirit, that the "soldiers" [of *Pericapritermes*] are extraordinary looking individuals with particularly extraordinary mandibles exhibiting marked asymmetry. I have been puzzling over the value of such an odd departure but have had to give

it up. They had a curious habit too of jumping in a manner recalling some *Ponerinae*. Their jump only carried them half an inch to an inch away, but it was most characteristic and was not a feature of the workers. These latter too have normal symmetrical jaws. I could not detect any intermediate forms and the soldiers were curiously few in number and isolated. [Believing that only one species was present Farquharson assumed that the soldiers of the other two were workers.] Though I can send you no sexual forms, perhaps the species is well and easily recognised by its odd soldiers.

The species of Termite is one that fastens on to large bush stumps and gradually converts them into a carton and mud heap, mainly carton, unlike *T. bellicosus* our commonest form whose hill is entirely of clay.

2. *A Swarm of winged Termites bellicosus Smeathm.*

Sept. 18, 1917.—Termites are the same [as *Camponotus maculatus*, in the sexual forms being phototropic, the others lucifugous: pp. 424–25]. The flying stage of *T. bellicosus*, which I believe is our commonest one (it is preyed on by *Megaponera*), is a bigger nuisance than all others and is all the worse from being more frequent. Not long ago a swarm of these invaded my place. They soon drop their wings, and in that de-alate condition are much relished as an article of food (cooked) by the Yorubas. I find a hurricane lamp placed in a basin of water a useful trap. After dinner I went out to see the “catch,” and found the night watchman (this was at Ibadan) eagerly sweeping up hundreds of them that had alighted round his lamp. He plunged handfuls of them into a bucket of water to keep them from wandering off, and appeared thoroughly well pleased over this manifestation of the bounty of Providence. A little native cat of mine was also very busy eating those that escaped the watchman. I watched “William,” the cat, with amusement at first and then with closer interest as he started hopping round in evident trouble, something obviously having bitten him. A serious-looking and somewhat inflated frog (he also happily gorged) was also moving out of the way. I went down the verandah stairs to investigate, and found that the Termite winged forms were coming from numerous innocent-looking small holes in my quite level compound. There was no hill, and their presence there was a great surprise to me. But the source of “William’s” trouble and of

the frog's caution was soon evident. The watchman also suddenly became acutely conscious of it. The surface of the ground was swarming with soldier Termites, and a *bellicosus* soldier gives a rather severe bite. After a time the swarming ended and the soldiers disappeared underground again.

C. PSOCIDAE.

Psocus nigeriensis Newst., sp. n. (p. 452) and two other species on "Ant-trees" at Agege.

[Material:—Eight *P. nigeriensis*, labelled "Common on Pará-tree bark (gregarious), Pará Rubber plantation, Agege, Sept. 22, 1917."]

Agege.

Oct. 18, 1917.—During September there were to be seen on the Pará trees colonies of curious little creatures that appear to me to be related to *Psyllidae* or some nearly related group. At first they are wingless and sit and feed crowded together in a circular mass about the size of a crown piece or even larger, apparently in defiance of *Oecophylla*. They retain the gregarious habit till they become winged, after which I think they must separate. The imago after the last change is at first whitish in colour. In the mass they are by no means conspicuous. Just to-day I came across yet another curious colony, very like young *Psyllids* but protected by a thin silky web. I hope to get a few mature forms with good luck. Under the web are enormous numbers of eggs, of oval shape. I sent you one or two of the first group and will send more later.

Moor Plantation.

Feb. 4, 1918.—I am sorry that they were in such bad condition, for they are the most dreadful beasts to put up that I've yet tried. That was why I put some in spirit—immature forms—though I had another reason too, of which I'll tell you. I wished to let you see that they had abdomens, for they shrink terribly in drying. When alive they are miserably soft and delicate creatures, the slightest pressure causing them to burst. They are likewise very difficult to catch, not because they take alarm and fly: they don't, but they refuse to leave the bark of the tree. The net cannot be used, and when one puts

a tube over them they simply sit still or at least won't go up the tube. I may say that I know of three species! All so far I have found on "ant-trees," but I've had two horrible misfortunes in losing two sets of the others, but it is only a matter of time before I get them again. My chief reason for sending the spirit ones was because I saw no evidence of the adults feeding, while the immature forms appear to *eat* bark! I intended to look for a biting apparatus, but had to send home the material before I got time; but what I took to be their frass appeared to be solid. Let me say definitely that the ants do *not* attend them, they ignore them, though why they should tolerate such soft-bodied, harmless things I don't know. The Pará species is left alone by *Oecophylla*. The other two species were on *Cremastogaster* trees, *Antiaris* and an Anonaceous tree, the latter a beautiful form with almost black wings. It seems almost incredible that such large insects could have been overlooked. They feed in a colony and remain together till the last, when they disappear. Males I think are very rare, if the males are one or two relatively tiny forms that I've seen amongst the crowd of large ones. I am sure they are not sucking insects. I should say a colony might number a hundred or two. They generally congregate in a circular crowd. I think I know their eggs, which are like little rafts of mosquito eggs, very similar indeed, but I was waiting a chance to see them emerge before making any announcement. I am looking forward to hearing more of them. I'll try sending the next I get in wool like mosquitoes. I am in hopes that I may get some more when I run down to Agege to pay my labourers there. The black-winged species I found here, but they aren't "on" just now. But it's only a matter of time—and good health. There's another quaint group of Psyllid-looking creatures that spin a protective silky web. They also are "corticolous," but are very much smaller. I'll get some of them too.

Feb. 12, 1918.—[Speaking of his first doubtful belief that the insects were allied to *Psyllidae*.] You will gather from my last letter that I *had* doubts, lots of them, but somehow I never thought of looking in Sharp, Pt. I, for them. What upset me was the "frass," which led me to believe them to be mandibulate insects, at least before the imaginal stage (for I have never seen them feed then). I vaguely wondered whether suctorial insects like Psyllids

might not have evolved through such forms, and of course didn't take the time I ought to have taken over them. It is a dreadful lesson and I feel so *intensely* annoyed about it. The only Psocids I've ever seen—and I grieve to say I took little note of them—were under cover-glasses in Canada balsam—microscopic things. I *will* try to get more and work out the life-history.

Feb. 14, 1918.—It is remarkable that such wretched soft-bodied animals can live on the same trees as *Oecophylla* with no protection at all in the way of silk.

III. HYMENOPTERA.

[Between 1913 and 1915 Farquharson made many valuable observations on the life-histories and habits of Aculeate Hymenoptera at Moor Plantation; but this work, with the exception of the following, was undertaken under the direct influence of his friend Lamborn, and its publication is better deferred until their joint labours can be communicated to the Society. It would not be right to include one share without the other, and Lamborn's is too extensive for incorporation in the present memoir.]

A. HETEROGYNA.

1. *Notes on Paltothyreus tarsatus F. and Megaponera foetens F.*

[See also Farquharson's earlier notes on these ants in Proc. Ent. Soc. Lond., 1915, pp. v, lvi-lix.]

May 28, 1915.—You will have begun to wonder whether I am ever to send you any insects at all. It is not that I have not tried to get something done, but up till now I have had very little success, partly from mistakes in technique, partly from ill-luck, but in the main from lack of time. My chief bit of ill-luck was with *Paltothyreus*. One morning after a tornado I noticed a large winged ant apparently looking for a nesting-place. I put her into a tin and got her up to the laboratory; I got ready a glass jar with some sand and small stones and cautiously opened the lid of the tin. She had dropped her wings, which I have kept. I put her into the jar and in no time she started to dig herself in. I put live earthworms into the jar, but these also dug themselves in, and as far as I could see, she made no attempt to attack them; in fact, for her

large size and formidable appearance, she proved extremely timid. She retreated before live house-flies even. I then killed food for her and put it at the mouth of her burrow. Whether it was dead worms, flies, or Termite soldiers, all disappeared. She distributed them at different levels, and in a few days' time I was able to see a few eggs. These had developed into fair-sized larvae in one or two cases, when something went wrong. Minute mites and equally minute flies attacked the food-supply, and for some time I have seen no other signs of life. Fresh food no longer disappears, but I have not yet opened the nest.

[The following note refers to Proc. Ent. Soc. Lond., 1915, pp. lvi-lxi.]

July 26, 1915.—I was greatly interested in the additional notes from Dr. Arnold's work on *Megaponera* and *Paltothyreus* [in Ann. S. Afr. Mus., vol. xiv, 1915, p. 1], and more than ever wished that Lamborn had been here. We would have gone to every corner of the station where *Paltothyreus* was to be found to check his (and my) observations. Unfortunately I do not know of *Megaponera* here [at Moor Plantation]. Arnold's observations are rather at variance with mine, and I am most curious to know whether Neave and Stigand support either of us, or whether on the East side still other variations in their behaviour occur. I am writing Lamborn about *Paltothyreus*, for he must have been very familiar with their habits. I must say I have never actually heard the stridulation of *Paltothyreus*. It cannot be so marked as that of *Megaponera*, or if so it must very seldom occur here that they stridulate at all. When I made my serious observations on *Megaponera* (I had previously observed them casually, giving them a wide berth, and put them down as *Paltothyreus*), acting on Lamborn's hint, I was most careful to describe only what I saw, for he had never seen *Paltothyreus* on the march. I doubt if he remembers the incident, for he probably thought I had made a mistake and hadn't given the matter a second thought. I felt, however, that it was up to me to substantiate my story. Merely to stamp on the ground in their neighbourhood is enough to produce the disgusting smell which is so characteristic of *tarsatus*. When I met the big ants on trek this was the first thing I did. The result was the loud hissing and no smell. To make absolutely certain I trod lightly on one or two so as to injure but not kill them,

for I had no forceps with which to hold an undamaged one, and I thought from the look of them that a forceps would be indispensable. I then got hold of the damaged ones in my fingers and smelt them at close quarters but could detect no smell, nor could my friend, the late Mr. Owen, whom I asked to confirm it.

I cannot quite understand the "great disparity in size between the two forms composing the colony," which has a "very singular appearance." The specimens which I brought home were typical and so far as I remember do not show a very singular disparity. I did not see the males and females. I had a winged form, or thought I had, of the species, but it got lost. It had emerged I think prematurely. I may have the good fortune of course to see them again, and even to see the actual raiding of a Termitary. By the way, is the prey of the Matabele ant the same species as that of the Nigerian *Megaponera*, because if so the three or four victims that each "usually" carries surely cannot be soldiers? In nearly every case my specimens carried soldiers, and some of the individual soldiers were larger than the ant.

I thought at the time that to carry one and maintain its place in the ranks was no small feat on the part of a single *Megaponera*. I should think they specialise in Termites. *Paltothyreus* does not. I mentioned that earthworms are a common prey, though when a Termitary is broken open they are soon in evidence. My female, *P. tarsatus*, which by the way was ruined by mould or some other agency (I have only the cast wings left), was, considering her size, very timid, and retreated before a soldier Termite, so that I supplied them to her dead lest she herself should be destroyed. These she always carried down the burrow. A wretched big Sarcophagid fly accounted for her larvae, I think. I cannot say I have ever seen them even in a small file, but their nest or colony has numerous small exits with earth borings round each mouth or opening, and they keep constantly foraging round the immediate neighbourhood, each independent of the other.

Arnold really had astonishing good luck to see their migration to a new nest and their queen too. Still I may manage to complete the account of the Nigerian ones. I think it would be well to get a few notes from Lamborn on *Paltothyreus*, especially in regard to the stridulation. It is possible we are all right, but I am glad that Lamborn's

innocent challenge led me to take greater care than I might have done.

Sept. 28, 1915.—In the Shagamu district down to Ikorodu (W. of Epe and Oni) I saw lots of the Matabele ants [*Megaponera*], always with the same prey. They are very abundant round there and are called by the natives (Yorubas) "Janijogu" (syllables all of equal length), which signifies "fighting" or "warlike." I had no opportunity of getting at their nests. I got a few more specimens.

2. Notes on *Camponotus maculatus* F., var. *melanocnemis* Santschi.

[Material:—A long series of ♀♀, varying, although not greatly, in size, taken May 25, 1915, from a nest in an old Termitarium in the decayed base of a large tree. It is probable, although not certain, that the tree was the one referred to below as cut down on May 28. For the relation of this form to Lycaenidae see the notes on *Catochrysops phasma* (p. 392) and on *Lachnocnema bibulus* (p. 388). The ♀ ant attending a pupa of this last Lycaenid came from the same nest as the above-mentioned series.]

May 28, 1915.—We have been having rather heavy rains to date. My last piece of entomological news relates to ants again. To-day a large tree was felled here, and in the decayed base of it was a nest of what I take to be *Camponotus maculatus*, var. *melanocnemis*. I failed to find the queen, but I got larvae in all stages as well as pupae, the latter being in pale flesh-coloured cocoons of very thin texture. I will send you, this mail, specimens of larvae and cocoons as well as soldiers and workers. What puzzles me is, that last year we had an extraordinary flight of winged forms which Dr. Lamborn took to be of this variety. They were very large insects. A few winged forms came from prematurely ruptured cocoons to-day and they are quite small. However, I have secured a large number of pupae, larvae and adult forms, which I have put into a box with wood from the same tree—in fact, the portion where the nest was, which had been previously tunnelled by Termites—and they appear quite at home. All the pupae and larvae are stowed away out of sight, and the adults are now gorging themselves with sugar at eleven-and-six per stone. They ought to do well.

March 1, 1917.—When I went down the other night well after dark to look for evidence of night-feeding [by *Tera-*

toneura imagines, p. 349], I went to the *Cremastogaster-Argirolaus* tree and was surprised to find the large *Camponotus maculatus*? var. *melanocnemis* running all over the tree. I remember cutting into a bit of the decayed heart last tour and causing a hurried sortie on their part, but I had forgotten that they lived inside the decayed heart. They appear to be night-hawkers. It is rather extraordinary considering their great size and heavy armament in the way of jaws. But, although *Cremastogaster* never seem to stop, I visit that tree every day and never see one *Camponotus*; yet that night they were all over it. Yet the nuptial flight finds the fliers in a markedly phototropic mood, and they are a dreadful nuisance now and again in the house. The flying stage is such a large insect. They always come about dinner-time, 8 p.m., and I have to shut doors and windows at the risk of suffocation. One can actually hear the patter of them at the lighted window, reminding one of a shower of hail at home.

Sept. 16, 1917.—*Camponotus maculatus* is a nocturnal ant. One occasionally sees workers in the open on plants in the daytime, but very seldom are soldiers to be seen. I know of a nest at Ibadan in an old tree from which I can make a few outraged soldiers emerge at will by thrusting a little twig into the opening—a sort of friendly call to make sure that my friends are still to the fore. But at night the whole neighbourhood of that tree is alive with them, soldiers and workers too. In spite of their great size and heavy armament, these soldiers are singularly timid. They cover the retreat rather than pursue aggressive tactics. A Driver soldier will bite at one's bootlace or puttee in impotent fury, and even the relatively tiny soldiers of a *Cremastogaster* colony make for the enemy at sight. *Odontomachus* hasn't got such a name for nothing. He lives up to it. As for *Oecophylla*, at the first alarm the whole crowd come out on to the surface of the nest ready for action, all facing the enemy. I have often amused myself "drilling" them by moving a little twig from side to side just an inch or two (or even at considerably longer distances) in front of them, moving it like a precursor his baton. At each change of position their heads and bristling antennae are turned simultaneously. One can do the same with a Mantis, but he somehow is a conical spectacle as he orients his head; *Oecophylla* inspires respect, and so does *Megaponera*. There are two or three nests of them

here now, and I really do think it is a horrid libel to apply the adjective "foetens" to them. By-the-way, did I tell you that Mr. N. H. Thompson, the Chief Conservator of Forests, agrees with me that they do not "stink away the enemy"? I think I came on that phrase somewhere in Sharp the other day. If man be the enemy, how true that is of *Paltothyreus*! An alarmed colony of *Camponotus maculatus* forthwith sets up a great tapping, which is most distinctly audible on the hard stem of a tree.

Sept. 18, 1917.—About *Camponotus* one other note. Lizards are extremely fond of them, the workers at least. Daytime stragglers are eagerly snapped up. A tiny *Agama*, running about near the door of my bush hut here, came and carried away some of those from my carton material which had escaped from the box.

Is it not odd that the asexual stages should be so markedly lucifugous while the sexual individuals are as markedly phototropic? Earlier this tour, I think about March, I was at a place called Oyo (Awyaw) about 30 miles N.W. of Ibadan. Just as it was getting dark one evening I saw the beginning of a nuptial flight of *Camponotus maculatus*. They also were issuing from a small hole in the ground. (If I get back to Oyo at all I'll seek out that place again, for other [Lycænid] reasons!) As in the case of the Termites the soldiers also came out in force, covering the ground for some distance round the various craters, for the nest had multiple openings. The winged forms didn't start off immediately on emergence, but many went back into the nest, though it was impossible to tell whether or not they came out again.

3. Artificial Ants' Nests: Inquiline Mites.

July 26, 1915.—I have tried my hand at an ants' nest, but we have very little plaster of Paris here, and what there is has gone off a bit and my first nest hasn't set. I'll describe it later, but meantime it contains a fine little family of what I take to be a Camponotine which I got from a newly felled palm. They are small ants about the size of our house Pheidoles, black, and run about with extraordinary rapidity. I secured two apparent females and one or two workers with a lot of cocoons, for the pupae are in little white cocoons. I am greatly afraid of mould, but am to try another form of nest. Meantime they are doing well and like brown sugar. What is more, they are parasitised in several cases by a sort of preserved-strawberry

red mite. One or two have two or three or four mites, and I think, so far as I have observed, the mites take up a symmetrical position on the pedicel. There is a much larger fat-looking mite moving about among the débris, which I'd like to prove was the female parent. With a little luck, however, I may make something of this lot. I have also another family, with naked pupae, of an extremely minute red ant, hardly over half as big as a *Monomorium*.

Aug. 11, 1918.—[Probably referring to the above nests.] Another thing I was keen on working up was the mite inquilines on one of the Pheidoles here, not the house one. I found them duly arranged as described in Wheeler, on the callows of the species, but my nests were destroyed by *Monomorium* and I never got the chance to set up new ones.

B. FOSSORES.

Ammophila lugubris Gerst. (*beniniensis* Beauv.), its Prey and its Enemies.

[Material:—*Ammophila lugubris* (Proc. Ent. Soc., 1918, p. cxxxvi)—1 ♀ labelled "No. 2.—30.v.1915," accompanied by the relatively large stone plug of its burrow and one of the Tachinid flies bred from its prey. The fly, which is labelled "Tachinid fly, emerged 20.vi.15," is the type of a new species described by Dr. Villeneuve on p. 518 as *Hilarella helva*.]

May 31, 1915.—Yesterday I saw a most interesting sight. A wasp, I think an *Ammophila*, was dragging a Noctuid larva along the ground, with a view to burying it, and I stopped to watch her. Closely following her was a Chrysid. The wasp selected a place for a burrow and started digging, the Chrysid sitting close at hand. This wasp digs a very shallow nest and soon proceeded to stow away the prey on which she oviposited, as I afterwards found. Instead of filling the nest with the excavated earth she came back with a small stone and was just about to place it when a small fly, most probably a Tachinid, for it happened so quickly that it was all over before I had time to attempt to catch it, swooped down and appeared to drop her egg or eggs on to the tail of the larva which was just visible. The wasp simply placed the small stone and went off to get another. As she was placing this I captured her. The Chrysid I lost. I dug out the larva and saw the wasp egg, but at the time saw no sign of the Tachinid egg. I did not do a careful examination, for

I didn't wish to expose what I had got to the sun. I thought the fly ova had been lost in the soil. The wasp egg was placed about the middle of the host body and was quite conspicuous. It could not have been seen without digging out the larva. Yet shortly after, when I reached my quarters, I observed signs of life beside the wasp egg. Four or five minute maggots were "crowding" round it. To-day the wasp egg has disappeared, as far as I can see, and the maggots appear to be trying to enter the larva. Now, unfortunately, there is a doubt as to the fate of the wasp egg. I think the maggots accounted for it. But the moth larva though unable to crawl is capable of a very strong reflex, and, as the maggots try to penetrate it, it jerks with vigour, and I have not been able to confine its movements as they would be in a cell in the ground, and the egg may have been damaged in this way. On the whole, however, I think not, for the larva was unable to roll over so that the egg would be underneath, and the egg could not come into contact with anything above. It was interesting to note that the larva, though it couldn't crawl away, could yet function in another way and excreted about fourteen faecal pellets. This would, I take it, materially assist its parasites by checking decomposition. I shall try to rear the flies, and if I succeed will be sure to send them on. I'll know by next mail, I think.

July 3, 1915.—[Referring to the material despatched.] No. 2 is the wasp of which I told you. Her prey had 4 or 5 viviparous Tachinid larvae dropped on to it as she was just about to close the nest. I failed to get the parent Tachinid which worked with such extraordinary suddenness and rapidity. None of the other flies have emerged, though I can see the pupae more or less distinctly.

[Comparing this statement with that of May 31, it must be regarded as uncertain whether the Tachinid larvae were deposited as such or emerged from quickly hatching eggs.]

C. DIPTERA.

Odynerus lateralis F., building its Nest in a Teapot.

April 24, 1918.—I've just noticed a most extraordinary and very funny thing. I've a strong weakness for tea. It is the finest restorer in the world (closely followed by a bath) and, even in this rather hard-living part, most men confess that they'd miss any "meal" of the day rather than tea, so I keep a reserve of teapots. Hearing a buzzing

noise over by the sideboard I saw a *Rhynchium* [*Odynerus*] *laterale* in the very act of going down the spout of one of the "reserve" pots. I have just discovered that the inner holes at the bottom of the spout, are "built up" with mud and the mouth of the spout in process of being also built up. It is my "going away" pot. I must remember to warn the boy next time I travel to Agege. These wasps are the most persistent animals. *Vespem "furea"* (any convenient missile or newspaper) *expellas, tamen usque recurret.*

IV. COLEOPTERA.

1. *Colour Associations of S. Nigerian Mylabrid Beetles.*

[The first three paragraphs refer to the species of an Ibadan colour-association, described in Proc. Ent. Soc. Lond., 1916, pp. xcix-cx, pl. B.]

May 3, 1917.—The suggestion that it was the sterile flowers that were eaten is correct [Proc. Ent. Soc., Lond. 1916, p. ciii]. I may say that just lately I have seen one or two forms on the flowers of native Convolvulaceae, which are abundant here and elsewhere in the Colony.

Lamborn suggests that the larvae may feed on the ova of the Acridian *Zonocerus variegata*, but before I'd got his letter these had disappeared for the season, but I will bear it in mind.

Dec. 12, 1917.—Do you know, a few months ago I had to go about the day after I had seen two *Decatoma affinis* Ol. (type) ovipositing! I had perforce to go away and leave them. I saw the ♀s digging holes in the ground like Fossorial wasps. One oviposited about 6 or 8 inches down, a mass of yellow sticky eggs. [A. Loveridge describes, in Proc. Ent. Soc., 1921, p. xc, the large *Mylabris oculata* Thunb., var. *tricolor* Gers. ♂ ovipositing in a hole about 1 in. deep.] I had hoped to follow up a tip from Lamborn to look for them in contact with Acridian ova, but they were in contact with nothing that I could find. The other ♀ was just starting to excavate. That is only one of many disappointments.

[The remainder of this section describes a somewhat different Mylabrid association from another locality. The material is tabulated in detail on p. 432. The species were kindly determined by Mr. K. G. Blair with the able assistance of Mr. H. Britten in the preparation and examination of male genitalia.]

Agege.

Oct. 17, 1917.—I am only here for a day or two waiting for a boat from Lagos to Port Harcourt, from which I go up the new line for a bit and then strike east to Okigwi.

Port Harcourt.

Nov. 15, 1917.—I believe I have found still another facies of the *Decatoma-Coryna-Mylabris* complex. I won't be able to send them from here as they are not dry yet, but I will I hope manage them for the next. I'm afraid they will be all I'll be able to send for my Xmas gift, but I couldn't get a chance to do better. For most of the time I was travelling in country that is rather unsettled, besides being entomologically and mycologically rather arid—grass country. The treks were long and I had to keep in touch with unwilling carriers who were, not without reason, afraid to go twenty miles from their own village to the next rest camp. At this time of the year in these parts and over to the Cross River (that is in the Udi and Okigwi districts, east of the Niger, north of here about 100 to 150 miles) there is a notable head-hunting ju-ju in vogue. I believe the hands of the village belles are only given to youths who have sufficient enterprise to secure the head of some other tribesman. The limits to which "auri sacra fames" will push a mortal man are nothing to what Eros can do in these parts. The victims do not get a clean, straightforward death (nor even a quick stab in the back). They are subjected, I believe, to not a little ceremonial torture of a very dreadful kind. It is odd to think of this happening within ten miles of a railway. But I am getting away from my subject. I have got forms like some of those at Ibadan (*Decatoma*, I think), but others with the yellow bars on each elytron reduced to two yellow dots, the antennae black with a red tip, otherwise very closely resembling the Ibadan forms. I have got one or two others of other kinds, but unfortunately none *in coitû* and not a great series, for I simply had to snatch at them as I went along wherever their food-plant, a *Convolvulus*, occurred. As far as possible, too, one gets as much of one's trek in before the sun gets too hot, and, in early morning, say up to 8 or 9 o'clock from 5 a.m., they are hard to find. They rather like the sun and were not to be found in the heavily shaded palm groves. But they may prove to be of interest, and some day I may get a better chance to add to them.

I must now catch the mail. Port Harcourt you may not be able to find on the map, but it is located on a creek that enters the sea at Bonny, and is, I suppose, about 40 miles north of that place. It is one of the most important places in Nigeria, being the terminus of the new Eastern Railway which runs up to the Udi coalfield. An account of the latter you will find, I think, in a fairly recent issue (not more than 12 months old, I think) of the "Bulletin of the Imperial Institute." Part of its way, the railway taps districts enormously rich in oil-palms. Quite large cargo steamers (up to 7000 tons, at any rate) can come up here. Within a stone's throw of where I am now two considerable vessels are loading up coal and oil. Nigeria is undoubtedly a great imperial asset, and yet one meets people at home who have the vaguest notion of where it is on the map, or who think it is a part of Sierra Leone, a place called the White Man's Grave. I have even seen a review of our Department's annual report in an important paper, headed "Agriculture on the Gold Coast"!! I wonder if the Germans were as hazy about the Cameroons. I hope I may be able to make a little of it known to naturalists if only I could get a little more leisure.

Moor Plantation.

Dec. 9, 1917.—One of the boxes (for I sent two) contains the first batch of the new *Decatoma* facies of which I wrote you at Port Harcourt. I had to pack the specimens hastily on a false rumour of the mail going, but I hope enough will reach you intact for diagnostic purposes. I have kept some in reserve, but some of the larger forms I cannot replace. There are two which differ from all the others and from each other [*Mylabris afzelii* Bilb.]. They are the only ones I could get. I will first tell you where to find the places on the map. If you can find Onitsha on the Niger, well up towards the boundary between N. and S. Nigeria, the rest will be easy. Due east from Onitsha (22 miles by road) is the town of Awka. Still going eastward and a very little north you will find Udi, which is rather over 30 miles from Awka. Udi Government station is about 1200 to 1500 feet above sea-level. You will see that the road from Awka crosses a range of hills at Udi—the range running due N. and S. About 11 miles east of Udi is the new Nigerian Eastern Railway, not shown even on fairly recent maps. If you follow the ridge of hills northwards, about 12 to 15 miles, perhaps, direct and a little to the east, you will see a place called Enugu Ngwo.

That is where the great coalfield now being worked by the Government is located. The railway runs from Port Harcourt to Enugu, the present rail-head. Port Harcourt is at the head of the Bonny River and is practically the same as Okrika, which you will see on the old maps. I went to Enugu by rail, then took the road to Awka, which meets the Udi-Awka road at Oji River crossing. This involves a 26-mile trek in one day. The next day's trek took me to Awka, where I remained a day or two and was then hastily recalled back here to take over from the Director of Agriculture, who is going home by this mail. I returned to rail-head by a route which took me through Oji River and Udi. For the most part the whole area is grass country, except in valleys which carry heavier vegetation, or would if they weren't largely farmed. Palms (oil), however, are abundant and indicate the more fertile valley conditions. The "Decatomas" were not found in the more heavily shaded places, nor yet in the drier almost pure grass lands, but rather in the intermediate country. Owing to a faulty bicycle and the necessity to keep up with my carriers I could only—almost literally—grab at specimens as I passed along; wherever I saw the *Convolvulus*, which is their favourite food, I would stop for a minute or two and then hurry on, not favourable conditions for intensive work, but perhaps favourable for the discovery of the dominant types. I had certainly no time to select. Unfortunately I could not obtain a single pair; never saw any. On the day when I found the two unique specimens [*M. afzelii*] or rather the forenoon of that day, I found very few of any kind. The morning had been wet, and the species are distinctly sun-loving. The few I found were hiding under leaves. It may, of course, be that they knew the uselessness of looking for open flowers in the rain. Dull weather markedly retards the flowering of many plants (*e. g.* cotton). Such *Convolvulus* flowers as do open—they are campanulate in shape—fill up with water, swamping the ovary and anthers, the food of the beetles. The corolla is also eaten. In the circumstances I would not venture to say what environment conditions the dominance of any type. I would almost hazard a guess that altitude has not a little to do with it, but I had to give nearly all my time to the subject of coconut disease, which was the reason for my being there at all.

Jan. 12, 1918.—This letter is simply an appendix to the last one. I just heard to-day that a supplementary mail was going, presumably by some intermediate cargo boat.

Perhaps the next direct mail will get there before it. I haven't time to put up a box, but I wouldn't have risked it anyhow. I am glad to say that I had no mails on the "Apapa," that I know of at least, and I believe my last parcel has got safely home. Two or three of the Decatomas were unique and I haven't got duplicates to send.

I got the papers from the Entomological Society, and have to thank you so much for getting me elected to its fellowship.

March 2, 1918.—The "Appám" (now called the "Mandingo") took home the Decatomas. I hope these will get as good luck. I only wish I had more to send.

April 28, 1918.—The Decatomas apparently complicate the original complex. I wish I could have got pairs, but it was impossible. The Ibadan ones are now beginning to appear, and I hope to make a collection of pairs this season.

[The Mylabrid beetles, belonging to five species, are tabulated below according to locality and also the order of time. Precise dates are not available.

Captured (mostly in <i>Convolvulus</i> flowers in strong sun), Nov. 1-15, 1917, in the order of time I-IV).	<i>Coryna chevrolati</i> Beauv.	<i>Coryna hermanniae</i> F.	<i>Mylabris tibialis</i> Mars.	<i>Mylabris vestita</i> Reiche, or close to it.	<i>Mylabris afzelii</i> Bilb. (nec Mars.), var. V.
I. Road from Enugu Ngwo to Oji River crossing on Udi-Awka road.	19				
II. Road from Oji River crossing to Awka.		3	3	3 (2 melanic and 3rd darker than any in IV).	
III. Road from Awka to Udi.	43		1		1 (Anterior half of elytra orange, posterior black).
IV. Road from Udi to Enugu Ngwo.		1		9 (1 with trace only of anterior black bar).	1 (As above, but trace of posterior orange bar, stronger on L.).
TOTALS .	62	4	4	12	2

The general appearance of the Awka-Udi association, with the exception of the 9 *M. vestita* in IV., is much darker than the Ibadan series illustrated on Plate B of the 1916 Proceedings. The latter, in fact, gives an impression of orange insects with black bars, the former of black insects with narrow yellow or orange bars, which in *C. chevrolati* are broken up into spots. The two *M. afzelii* and two of the *M. vestita* in II., however, have lost the appearance of barred forms, the latter being melanic, with only faint traces of orange, the former orange anteriorly and black posteriorly, thus resembling, although much darker than, the vars. of *D. affinis*, *M. hermannioides* and *M. farquharsoni* in which the anterior black elytral band is wanting (Proceedings, 1916, pp. cvii-cix). The much blacker appearance of *afzelii* is due to the posterior orange bar being obsolete or absent. One of the 9 *vestita* in IV. resembles the Ibadan forms of the same variety.

Comparing the size of the beetles in the two localities, *M. afzelii* is much larger than any of the Ibadan series, *M. vestita* of about the same size, the other three species considerably smaller, this being true of the four examples of the only species common to the two—*C. hermanniae*, which is smaller as well as darker than the Ibadan average. It is probable that the Ibadan *hermanniae* has converged towards *D. affinis* and the dominant *M. farquharsoni*, the Awka-Udi *hermanniae* towards *M. tibialis* and the dominant *C. chevrolati*; but much larger numbers are required to test this conclusion thoroughly. Larger numbers are also required in order to determine the extent and the meaning of the difference indicated by a comparison between the three specimens of *M. vestita* from locality II. and the nine from IV.

The Mylabrid beetles here tabulated were accompanied by seven examples of a fine Homopteron, the Cercopid *Locris maculata* F. with the label "widespread in the Awka-Udi districts, also at Ibadan." Six of these are yellow, black-marked insects with considerable general resemblance to but less dark than the Mylabrid vars. which have lost the anterior black bar; the seventh is nearly melanic, the yellow being reduced to two narrow bands made up of small spots. This form resembles the two melanic *M. vestita*. A further collection with precise localities would be of much interest.—E.B.P.]

2. *Erotylid Beetles aestivating in the empty Clay Cells of an Aculeate Hymenopteron.*

[The observation on *Episcaphula interrupta* Lac, recorded in Proc. Ent. Soc. Lond., 1913, p. exxii; 1914, p. xxiii, is so curious that further details are added from Farquharson's letter. The first and last sentences refer to a suggestion that, as *Erotylidae* are fungus feeders, the supposed cells might have been fungi.]

Feb. 10, 1914.—It sounds almost like libel to suggest that I confused clay cells with a fungus, which some one seems to think must have happened in connection with the discovery of the *Erotylids*. It is fortunate that Dr. Lamborn saw the actual cells. Perhaps the vagueness of my note misled them. I may briefly recount the circumstances. While examining a stump by the side of a small stream for Mycetozoa I came across two small cells of the "Potter" class. Frequently the bottom of these cells is not of clay but is simply the flat surface of the object (wall, log, etc.) on which the cells are built. Or the cells may only be partly "floored" with clay, as if the builder were simply adding a little for levelling purposes, so that on prising off a closed cell the larva or pupa may easily be seen. The first of the two cells that I prised off was of this order, and, as soon as it was detached, the beetles started to come out. I hastily put the lot, cell and all, into a closed box. A little wood from the stump came away with the other cell, and as the "lid" of the "pot" was stopped, loosely, I think, with débris and not with clay, and nothing tried to get out, I simply put it into my vasculum. In the evening, when we came to compare notes as usual, I handed the cells to Dr. Lamborn. On opening my vasculum I found that the *Erotylids* were just beginning to come out of the second cell. Of the composition of the cells there was no doubt. They were of clay. At the time, I think, we concluded that the beetles were aestivating. I think we dismissed the idea of their having been stored by a wasp, as they were extremely lively on issuing from the cells. I fear I can throw no further light on the matter, but I think that if the B. M. authorities make such dreadful suggestions I shall seriously consider the question of sending any more *Myxos*!

3. *Notes on the Life-history of the Endomychid Trycherus flavipes* Arrow.

[The species was described from Farquharson's bred specimens in Trans. Ent. Soc. Lond., 1920, pp. 10, 11. Material:—2 ♀, emerging Oct. 9, 1917; 2 ♂ 2 ♀, Oct. 17 (1 ♂ 1 ♀ with precise pupa-cases); 2 larvae in spirit. All

from Agege. A ♂ (the type) and 2 ♀ are in the British Museum.]

Agege.

Oct. 18, 1917.—On the same Agege *Hewitsonia-Argiolaus* tree [*Antiaris africana*] I found some curious little spiny Coleopterous larvae that the ants seemed to leave alone. These run about freely, and not really very rapidly, apparently being able to take their own time, regardless of the ants. They pupate on the bark, in tiny pits or crevices. In one case I got two just beside a *Hewitsonia* pupa. Till yesterday I only had two pupae. These I got before going to Ibadan at the beginning of this month and they bred out there. I sent one as they were scarce, but now I shall have half a dozen at least, I think. I have decided that they are Endomychidae. One emerged yesterday evening about 8.30, and this morning there were two in addition. When newly emerged (the first one) it was whitish in colour and the wings were for some time kept unfolded and projecting beyond the clytra.* It seemed to me to be an amazingly large animal to have come out of such a tiny pupa-case. The Endomychid larva (if I have correctly classified it) appeared to feed just as the *Hewitsonias*.

Moor Plantation.

April 17, 1918.—I am so glad that the Endomychid was workable after all. [Mr. Arrow considered that the colour of the first specimen shown him had not quite matured.] They must take a good time to harden, for I left them, in one or two cases, at least 24 hours before killing. However, I'll probably get better material this year again.

Aug. 11, 1918.—By the way, I found the Endomychid larvae on the *Cecidomyia* tree [p. 442] to-day and have got one pupa. I am sure it is the same one as I get at Agege. [Young larvae were again seen on the "ant-tree" on Aug. 25.]

4. *Dermestes Larvae and Mites in Cremastogaster Ants' débris at base of "Ant-tree."*

Aug. 25, 1918.—While I was stooping down for a tin I noticed one other thing. At the bottom of the tree is the

* The following note was written Oct. 18, 1917, at Agege: "Just lately I have been breeding out a Coccinellid that feeds on *Aspidiotus destructor*, the pest I am going to Okigwi to investigate. They do not appear to expose the wings after pupation [like the above Endomychid] but sit as still as a Coccid and looking like one."

ants' "kitchen midden," full of the usual débris, chitinous rings of all sorts of dead insects and goodness knows what else. I noticed the surface "heaving" and proceeded to investigate. I expected Dipterous larvae like those I got on the refuse heaps of *Paltothyreus* at Agege [see pp. 519-20], but instead I found brownish rather maggot-shaped larvae with rings of brown bristles, but whose head end was the broad end, the posterior end tapering to a point with long golden bristles. I could see no head (as they shammed dead, I at first thought they were Dipterous pupae), and indeed so far I have not examined them closely. But they have thoracic legs and run about quite actively after their initial "sham." Their shape is very *Lepisma*-like without the "tails," and I think they are Coleopterous. I am hoping they are nearly full-grown. I am to leave them with Dr. Connal on the off chance that they may breed out, and will take a few larvae with me. I could easily have obtained dozens of them. Incidentally the "refuse" was simply crawling with mites, and when I opened the tin this evening to see how things were doing, I was astonished to see that these had all congregated to one spot on a round piece of débris which looked like a round reddish-brown ball, so numerous were the mites. The lamp-light made them scatter and bury themselves at once.

5. *The Life-history of a Drilid Beetle, probably Selasia unicolor Guér., bred from Snails.*

[Material:—In spirit, a large apterous ♀ probably of *S. unicolor* and a bristly larva similar to the one from which it developed. These larvae are well known in African collections and have long been suspected to be the immature stage of the Drilid, *S. unicolor*. Farquharson's notes make this conclusion highly probable, but it is to be hoped that male larvae will be found and bred.

Mr. K. G. Blair writes: "The *Selasia* ♂ is a VERY much smaller insect than the ♀ in question, and must come from a very much smaller larva. This disparity of size is really not contradictory to the specific identity of the two insects, as in our *Drilus flavescens* the disparity is almost as great. The larvae of the two sexes are also very different in size, and, like the *Selasia*, feed on snails, hibernating and pupating in empty shells of their victims, but they do not appear to bury them as does the *Selasia*."

"We have a note by Dr. F. Creighton Wellman attached to one of these larvae from Angola:—

“ ‘ The natives state that if you step on it with bare feet the bristles pierce the skin of the sole and work into the flesh, causing inflammation and even gangrene. Native name “ *O-cisia* ” (= noli me tangere). I have seen a whole caravan of porters warning each other in this fashion when an *O-cisia* was in the path : “ Step to the side ! There is an *O-cisia* ! ” ’ ’]

May 28, 1915.—Last year Dr. Lamborn bred from a large snail which flourishes out here a number of beetles—*Drilidae*, I think. I never saw them. It was before I came back from leave. One day a week or two ago I saw a curious-looking larva—I had seen them before without understanding their significance—quite near to a snail shell. I had been in hopes that I might one day see Lamborn’s beetles in operation. I am not sure whether he saw what I am going to describe, but if it is old news it will at least be independent corroboration. The larva is a rather flat active creature, which I will describe when I send you a specimen. I sat down to watch its movements. It ran round the snail once or twice and then crawled on to the top of the shell. It then appeared as if it were about to crawl off again, but its posterior end remained attached to the shell while the head and legs were on the ground. To my surprise it proceeded to push the snail backwards by extending its own body, in a manner recalling the Scarabs, except that the snail was shifted bodily and not rolled or trundled. I concluded that the victim was being carried off for burial, where the earth was soft, for all this took place on a hard path. I put both together into a tin with some earth, and reached the laboratory about an hour later. When I opened the tin I found the snail nearly buried by a process of undermining. I half-filled a larger box with sand, into which I turned the two and watched the process in comfort. When the undermining was in progress the unfortunate snail ventured out, but the enemy doubtless feeling the strain, for the sucker pseudopod never let go, turned round and drove the victim well home. In about an hour’s time the two disappeared underground. Nothing has happened since. I have, however, secured three or four more larvae, which I supplied with snails. They, however, didn’t bury them, but started their unpleasant work right away. I am in great hopes that I may get a few mature insects to send you.

July 26, 1915.—Now another note about my snail

parasite. This was the doubtful *pièce de résistance* of last mail. The bristly larvae after a time emerge from the empty snail shell, minus bristles of any sort. They are like a large rather soft-skinned larva [the apterous ♀], very bloated in appearance, with curious short antennae and a more curious appendage at the posterior end. One of them one day oviposited a mass of sticky yellow eggs and died. The eggs are sulphur yellow when fresh. They are undoubtedly eggs and the larva [♀]—a large thing over an inch in length and nearly half an inch broad—is absolutely apterous. But I've seen no males, and I think the oviposition may be parthenogenetic. I have them in a flower-pot covered over with mosquito gauze. The worst of it is they won't feed. Another has oviposited and died, and I have failed to get the eggs to develop, owing to mould or want of fertilisation. From the first box in which I had them it is possible that a smaller winged male might have escaped. It was not protected by gauze, and the wooden box warped. However, I am in hopes that I'll manage to complete the cycle. Material in the form of the bristly larva is plentiful.

I wonder if you could let me know what sort of a creature the Drilid *Selasia unicolor* is which Lamborn bred (by accident) from a large snail. It was before I met him last tour. I think if it had been this extraordinary apterous creature he would have told me of it. Only he told me so much that I may have forgotten.

[Lamborn bred a female Drilid, evidently the same form as Farquharson's, from a larva to which a snail was given, in mid-June, 1913. The larva-like female emerged July 31, and was determined as probably *S. unicolor* by Dr. Marshall, and the snails on which it feeds as *Limicolaria* sp.]

Nov. 24, 1915.—I got off a specimen of the snail-parasite, larva and mature ♀, with a few ova. The latter are sulphur-yellow when fresh.

[In later letters he spoke of his hope to breed the male beetle, and, on April 28, 1918, of noticing numbers of the larvae. The last reference, shortly before he sailed from Lagos, is as follows :—]

Aug. 11, 1918.—Looking back over the 22 months, it is very little that I have been able to do. I had hoped to clear up the *Decatoma* life-history, the snail-parasite, and I don't know how many other things, but at any rate I've got clues to work on, and, if I do not get the chance, perhaps somebody else will.

6. *A Carabid Larva attacking a Snail.*

[Dr. C. J. Gahan, who has examined this fine Carabid larva, informs me that it is impossible to determine its genus.]

May 28, 1918.—While at Agege last I noticed a fairly large snail climbing up the wall of an out-house. I was attracted by its apparently “frothing” or blowing bubbles as it climbed. It fell down, and looking at it I found that it was attacked by a very large Coleopterous larva which I have sent you—if it is a larva. It is a horrid-looking creature. I tried to feed it up or give it a chance to oviposit, but it died, so I “spirited” it away. I left the snail in the tin in case ova had been laid, and now find that a large Dipteron had been there. I do not think it can have become infected while I had it. But the pupae are there, and I may get them bred out.

7. *Proeryptie Beetles, probably Passalidae.*

July 3, 1915.—In a dead palm which had just been felled I got three very odd-looking beetles. They are very flat and hard, which I imagine is a special adaptation to permit of them getting between the closely pressed leaf-bases of the palm, where they were found.

8. *Beetles accidentally introduced in C. O. Farquharson's Consignments.*

[The following beetles were found in the cotton-wool or among the “papers” in a package received in January 1918:—CUCUJIDAE: 12 *Cathartus advena* Walt.; 2 *C. cassive* Reiche; 3 *Haemophloeus pusillus* Sch.; 1 *Silvanus surinamensis* L. CURCULIONIDAE: 1 *Calandra oryzae* L. SCOLYTIDAE: 1 *Taphrorychus bicolor* Hbst.

Loose in a box received in July 1918:—PTINIDAE: 1 *Lasioderma serricorne* F.

Loose in a box containing a pupa of *Teratoneura*, parasitised by small Chalcids (p. 459), received in 1917:—CORYLOPHIDAE: 2 *Sericoderus lateralis* Gyll.

The species were kindly determined by Mr. G. J. Arrow.]

V. DIPTERA.

A. THE HABITS OF TWO NEW MYRMECOPHILOUS CECIDOMYIDAE.

1. *Farquharsonia rostrata* Collin, gen. et sp. n. (p. 505).

[The material includes 6 ♀, captured April 13–15, 1918,

at Agege (152 ft.), 16 miles N. of Lagos, together with 2 ♀ maj. and 21 ♀ min. of *Cremastogaster buchneri*, r. *alligatrix* from the carton nest over which the Cecidomyids were flying. Also, from Moor Plantation, stealing from ants on carton nests—2 ♂ 3 ♀ taken Aug. 8, 1918; 7 ♂, together with a sample ♀ of the ants, near race *alligatrix*, taken Aug. 10; and 10 ♂ 8 ♀ taken about August in the same year.]

April 17, 1918.—Your letter of early March arrived safely, having been a month on the road, but we are always glad when the mail gets here at all. I have not been able to send anything for some time, for I have been very busy getting in the crops now that the rains have broken. However, I hope to get a small collection together soon. I think I shall manage to get you some more interesting Myrmecophilous Diptera. Last week-end I had to go to Agege on my monthly visit, and went as usual round the few *Cremastogaster* nests within reach. I got no Lycaenids, but I was able to study the doings of a number of yellowish-brown midge-like flies that kept constantly flying over the nest and indeed within the labyrinth of the carton. Observation as to their exact doings was extremely difficult from their colour and from the fact that they didn't alight at all but remained almost like Syrphids, though not for so long at a time. At other times they kept up a dancing flight till their immediate object made them at any time approach the nest. I was at last able to satisfy myself that the objects of their interest were ants that were in the act of feeding each other by the usual method of regurgitation. Seeing these on the surface of the carton or in a crevice of it, one of the tiny flies would immediately approach near enough for its head or proboscis to be in touch with the ants, and though, from the fact that they were rather shy and didn't actually come to rest, I could not actually succeed in seeing them appropriate a share of the food by sheer theft, yet I have not the slightest doubt but that they did. *Harpagomyia* doesn't alight on the carton, which is always much too lively, but hunts on the stem of the tree over the "run" of the ants. The food exchange is quite leisurely and friendly. I brought away a few of the flies with me and found them to be Nemocerous Diptera—apparently, and if Nemocerous Diptera, I regret to say that with much thought and mis-giving I can find no family for them except Cecidomyidae,

but, mindful of former misfortunes, I do not venture to say more than that they are Diptera. The antennae appear to have twelve or thirteen segments, with whorls of bristles, and are divided up by beautiful areolate markings. The venation of the wings is extremely reduced. The proboscis is quite a huge and rather remarkable affair, but you'll see them for yourself when they come. I hope to send them next mail. I haven't exhausted the Myrmecophilous Diptera yet, and am keeping them back so that I may send others with them.

[Farquharson had hardly posted the above record when he heard that his friend Mrs. Connal considered that the Diptera were *Ceratopogon*, with biting mouth-parts. He wrote later, on the same day, in some depression at what he thought must have been his mistake, but recovered to some extent when he began to recall the observed facts.]

April 17, 1918.—I can see what insects *do*, and I'll tell you nothing but what I see. I am by no means sure that the biting mouth-parts are actually used for biting. I am almost certain that my interpretation of their movements is the correct one. There would be no object in specialising *in pairs of ants* in the act of inter-regurgitation. I have written to ask Mrs. Connal if she will describe it and if so to allow her diagnosis to be published with the rest. I will send specimens next mail. The hind-legs, by the way, are carried like those of Culicidae.

Aug. 11, 1918.—It cheered me very considerably to write Dr. Connal that the Diptera *may* after all be Cecidomyids. Poor man he wrote me at the time that he had been made the "object of unlimited scorn" from Mrs. Connal over the mis-diagnosis. I think I told you that I have found them here also [Aug. 8; see p. 440], and, after very carefully watching them, I feel certain that my original view of their activities holds. They hover, with midge-like flight, as close as possible to the ant-nest, frequently going right into the outer cavities of the carton, till they see a pair of ants in the act of inter-regurgitation. They then dart forward a little, their wings all the time being in rapid motion, till their heads appear to be in contact with the point of contact of the ants' heads. What exactly happens I cannot say for certain, for they are harder to observe than *Harpagomyia*. But I'm sure they don't even try to bite the ants, and I can hardly doubt but that their object is to steal the "droplet" that

one of the ants intends for the other. I am confident that I shall see this happen. It is only a question of waiting till I can see the flies side-on. At any rate I am certain that only pairs of ants at regurgitation interest them, and that they never tackle solitary ants like *Harpagomyia*. Nor indeed do they ever come to rest on the surface of the trees as the mosquitoes do. (The mosquitoes keep in motion when actually soliciting food, but when not begging they frequently settle down on the trunk of the ant-tree.) Their hind-legs are backwardly directed when in flight, not unlike mosquitoes' legs, but their flight is rapid and dancing. I have spent a good part of to-day at one of the ant-trees (an *Alstonia*) which I do not visit as often as the others, for it has not yielded Lycaenids like the others. It is in a shadier part than the others and somewhat inaccessible, but I have had a path cut to it. It is very rich in *Harpagomyia*, but extraordinarily so in the Cecidomyids.

Aug. 25, 1918.—I spent a good part of to-day at one of the ant-trees just making sure of the habits of the Cecidomyids. The web-hangers [*Chaetodiplosis gymnastica*, see below] I feel sure are closely related, though not the same, the chief difference being in the proboscis. I am not sure that I haven't found a second species, or a variety of the first one [*Farquharsonia*], that appears to compete with a *Cremastogaster* (on the *Teratoneura* tree) for the secretions of *Stictococcus*. It does seem a most precarious mode of existence. Without doubt, the first ones sent do take advantage of the ants in the act of inter-regurgitation. I feel confident that the anatomists will agree that the extraordinary mouth-parts are for sucking only.

[Mr. J. E. Collin wrote Feb. 13, 1920: "I believe Farquharson was undoubtedly right in considering that the proboscis of *Farquharsonia* is for sucking and not for biting. The tip of the tongue-like organ is microscopically pubescent and consequently better adapted for sucking up liquids than for piercing. Also I found no trace of maxillae, which I believe are always present in biting or predaceous insects."]

2. *Chaetodiplosis gymnastica* Collin, sp. n. (p. 507).

[The material includes 8 ♂ 34 ♀ hanging from threads in the hollow at the base of the ant-tree *Alstonia*, at Moor Plantation, Aug. 11, 1918. Also taken with them 1 ♀ of a distinct species. See pp. 508-509.]

Aug. 11, 1918.—Near the base [of the ant-tree *Alstonia*,

p. 369] is a large decayed hollow up the inside of which is a considerable portion of the carton nest of the ants. I found that this hollow simply swarms with them. But in addition to these it suddenly struck me that certain curious little flies, which I had often seen before on ant-trees, but neglected to study, might be the Cecidomyids *at rest*. I had often meant to write you about these curious little flies from their habit of resting habitually on a silk web not unlike the webs of some spiders. I have often seen hundreds of them hanging by their fore-legs, rows of them, on such webs, and vaguely thought they specialised in spider-webs as a resting-place. Now, however, I am in doubt as to the origin of the silk threads, and I am seriously wondering whether the flies do not make them themselves. I am not sure that they are the Cecidomyids yet, but if not they are extremely similar, and when disturbed their flight is much the same, except that they quickly come to rest again on their silk threads. The threads do not appear to be traps for other insects. They are too widely separated. The insects at rest remind one of birds on telephone wires except that they hang down. Though I did find a large bug (dead) resting on the threads, I felt sure that it had fallen on to them after death and was too big to slip through between the "lines." I readily caught a lot of them by bringing together a box and its lid held in either hand. A portion of the "web" was included and in a few seconds the little flies had hung themselves up. None of them settled on the side of the tin. Some of them were hanging with one foot on a thread and another on a leg of the nearest neighbour. To-morrow I hope to have a look at them under the microscope to get a view of their proboscis.

B. THE PURSUIT OF LIVING ANTS BY THE EPHYDRID,
RHYNCHOSILOPA APICALIS COLLIN, SP. N. (p. 509).

[Material:—2 ♂ 3 ♀, taken Dec. 25, 1917–Jan. 26, 1918, feeding from the anus of dead *Cremastogaster* ants as described in Proc. Ent. Soc., 1918, pp. xxxv, xxxvi, xl.]

Aug. 25, 1918.—While I was studying these [Cecidomyids], I noticed some of the little "proctophila" and froze on to one in particular for special observation. I am now certain that they actually pursue living ants, smaller workers, pursuing them *from behind*, with apparently the same unpleasant object. They appear to select an

ant of reasonable size (not too big) and run after it, never flying after the "victim." Contact between the fly's head and the ant's posterior end is momentary (not the deliberate and prolonged contact as in the case of the dead ants). The fly then decamps (by a short flight) in search of another. The ants appear to resent the attention most seriously, for they usually stopped dead, bent back their heads and abdomens till they all but met, remaining thus for a few seconds before running off with the abdomen in the air. Unless alarmed, *Cremastogaster* usually runs along with the whole body parallel with the surface on which it is travelling. While I repeatedly saw this happen, I could never actually see the fly absorb anything, so swift was the contact and withdrawal, but I think the flies may be definitely classified as Myrmecophilous.

C. NOTES ON THE LIFE-HISTORY OF *MILICHIA ARGYRATOIDES*, AND THE HABITS OF OTHER MILICHIDAE.

1. *Milichia argyratoides* Collin, *sp. n.* (p. 510).

[The pill-box in which the ♂ and ♀ specimens referred to below were contained, bears the following: "Ant-flies, Mamu. 10.ix.15." A further note stated: "From Mamu, a village on the edge of a large forest reserve about 20 miles S. from Ibadan. The village called on the map Gambari is practically the same." The flies were bred out on the road.]

Sept. 28, 1915.—I sent also two small Diptera in a pill-box. I hope they arrived safely. They also are associated in the Shagamu district with the *Hewitsonias* and the ants. I've got a few fly larvae in spirit. They appeared to live on a running wound on the ant-tree. They covered themselves with excreta, and I saw one *Cremastogaster* carrying away some of the stuff from the surface of a larva. More pupated, but none have emerged. It is extremely difficult to look after them on the road. I had several *Hewitsonias* drowned in their box one day after I'd carried them for several days. We met a very heavy rain storm. Everything got wet, including my camp bed. I do hope the two small flies will be enough for identification.

April 17, 1918.—I have long wondered what the curious little Diptera of 1915 (*Milichia*) were, with their curious larvae. I hope to get back to the same district some day to get some more. I have no doubt but that they are genuinely Myrmecophilous, though they do not live inside

the nests. The larvae wander about in the run of the ants, soft, unprotected things, that cover themselves with excreta much like Criocerid larvae. The ants seemed to have a liking for this and fed on it, without at all molesting the larvae. They pupate in queer little cocoon-like things and more or less gregariously.

April 28, 1918.—When he [Mr. H. N. Thompson, Director of Forests] returns I am going for a week-end to one of his forest reserves, where I found the *Milichia* larvae, and can find many other good things too.

2. *Milichia farquharsoni* Collin, *sp. n.* (p. 514).

[The "haunting flies," referred to below as "absolutely guaranteed," consisted of 5 ♀, evidently captured on or around *Cremastogaster* ants' nests in May, 1918.]

Feb. 4, 1918.—There's a little black and extremely active Dipteron that haunts one of my trees and on it the huge *Cremastogaster* nest the inhabitants of which never seem to rest day or night. These little flies, in quite considerable numbers, alight on the carton of the nest, dodge about among the ants, and are always at it. Yet I've never been able to find out what they are after! A *Cremastogaster* nest is no place to sit down at, till one finds out—it is up a tree as it happens. But I've stood on a ladder till my legs ached without success. They aren't there simply for the fun of the thing I know, but that's all of their ways that I'd care to dogmatise about, and it's not very helpful.

May 28, 1918.—I told you I may possibly have sent Myrmecophilous Diptera whose exact doings I have not yet cleared up, but which haunt the nests of *Cremastogaster* instead of the real mendicants. By this mail I send a small number of absolutely guaranteed mendicants as well as a few of the others, also absolutely guaranteed. I know of still more Diptera closely related to these, and I find that the Cecidomyid occurs here also. I will write fuller notes later.

3. "Mendicant" *Milichidae* and *Mimetic Ant-flies*.

[The habits of these flies were described by Farquharson in Proc. Ent. Soc., 1918, pp. xxxiii, xxxiv, xl. The specimens sent in illustration and captured between Dec. 23, 1917, and Jan. 26, 1918, included three distinct species (at first only two were recognised, *ibid.*, pp. xxxiii, xl) described by Mr. Collin on pp. 512-14, viz. *Milichia proctes*,—1 ♂; *M. prosaetes*,—1 ♂, 1 ♀; *M.*
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dectes,—1 ♀. The “absolutely guaranteed mendicants” referred to above were received July 18, 1918. In mounting the specimens these “mendicants” were kept distinct from the “haunting flies”—*M. farquharsoni*, but the relationship to the notes was inadvertently lost, so that at first it was impossible to determine which group was “haunting” and which “mendicant.” They were all carefully labelled (1) and (2) and sent to Mr. Collin, who found in (2) two of the “mendicant” species sent before, while (1) contained only the 5 ♀ of the hitherto unseen species *M. farquharsoni*. It was therefore certain that the latter are the “haunting flies.” Group (2) of “absolutely guaranteed mendicants” contained *Milichia prosaetes*,—4 ♀; *M. dectes*,—2 ♂, 3 ♀, all captured, evidently in May, 1918, on *Cremastogaster* ant-trees.

The following extracts show that there are still other, probably undescribed, species of Milichidae to be found associated with *Cremastogaster* in S. Nigeria, together with an “ant-mimic” which cannot be placed with certainty. Mr. Collin wrote, April 17, 1921: “When one remembers that Farquharson found a Cecidomyid and an Ephydrid under circumstances and with habits so completely different from what one would expect in a member of either family, one hesitates to offer an opinion on the identity of the other small fly whose habits he describes.”]

April 28, 1918.—I am to look more carefully into the mendicant flies. There are at least two others that share Coccid secretions with the ants, one with the underside of the abdomen a silvery white. They are all associated with the same ants, and I may have sent them by accident mixed with the mendicants. However, I'll get more and so clear up the point. I should say they all belong to closely related genera. I saw the mendicants busy this forenoon.

Aug. 11, 1918.—At the same time [viz. when observing the Cecidomyids] I found some of the little “proctophila” besides another small fly that appears to be an ant-mimic (in spite of its wings). It wanders about among the ants keeping its wings in motion all the while in the manner of Ortalid flies when they settle, and appears to feed on undefined matter on the somewhat moist surface of the hollow tree. They settle among the ants and dodge about with extraordinary freedom.

Aug. 25, 1918.—When I was studying the Cecidomyids to-day I collected some of the mimetic flies of which I told you. They simply dodge amongst the ants and lick

up their food, whatever it be, from the surface of the tree-trunk. I can see their proboscis in the act. Viewed at certain angles (when the wings cannot be seen), they are really very like the ants themselves.

D. THE PREY OF THE ASILID FLY *PHILODICUS TEMERARIUS* WALK. (ASILINAE).

[The following table of captures made within a few days, by one species at one place, shows the existence of very comprehensive tastes. The only prey hitherto recorded for *Philodicus* includes but one Lycaenid and one Tachinid (Trans. Ent. Soc., 1906, p. 344). The allied Asilids exhibit a marked preference for Lepidoptera and Orthoptera (*ibid.*, pp. 372, 373). Of the 13 victims here recorded, 5 are Diptera, 3 Orthoptera, 3 Hemiptera, and 2 Homoptera. In identifying them I had the kind help of Dr. Guy Marshall, and, with the Diptera, of Prof. M. Bezzi and Mr. C. G. Lamb.]

Agee: 1917.	<i>Philodicus temerarius</i> .	Prey.
Oct. 21	♂	<i>Tettigoniella cosmopolita</i> Sign. (Jassidae: Homoptera).
" "	♂	♀ fly, probably of genus <i>Paralimna</i> (Ephydriidae).
" "	♂	The Capsid bug <i>Proboscidocoris</i> sp. A.
" "	♀	♂ fly, probably of genus <i>Paralimna</i> (Ephydriidae).
" "	♀	♀ Anthomyid fly, <i>Coenosia</i> sp.
" "	♀	Immature Acridian, <i>Acrydium</i> (<i>Tettix</i>) sp.
Oct. 22	♀	The Capsid bug <i>Proboscidocoris</i> sp. A.
" "	♀	<i>Tettigoniella cosmopolita</i> Sign. (Jassidae: Homoptera).
" "	♀	Immature Acridian, <i>Acrydium</i> (<i>Tettix</i>) sp.
Oct. 24	♂	The Capsid bug <i>Proboscidocoris</i> sp. A.
" "	♂	A Gryllid, <i>Euscirtus</i> sp., probably new.
" "	♀	♂ fly, probably of genus <i>Paralimna</i> (Ephydriidae).
Undated.	♂ and ♀ in cop., ♀ with prey.	♂ Anthomyid fly, <i>Coenosia</i> sp.

Prey of the 4 *Philodicus*. Individual captors not recorded.

E. THE TACHINID FLY *BENGALIA* ATTACKING TERMITES.

[See Proc. Ent. Soc., 1919, p. lii-lviii and references quoted, for evidence that *Bengalia* seeks Termites because it is unable to penetrate any but very thin-skinned insects or those which have been bitten by ants. See also Trans. Ent. Soc., 1906, pp. 394-396 and references, for the habits of the allied Oriental *Ochromyia jejuna* F.]

Agege.

Oct. 18, 1917.—One little incident of the great *maculatus*-Lycænid find [p. 392] I might just add while I remember it. When the Termitary was broken up the white ants were of course scattered over the ground, and, in no time, I am sure there were not less than a dozen *Bengalias* hawking around, to whom the feeble Termites fell an easy prey. At Ibadan some time ago I got one of these enterprising flies in the act of attacking, successfully, a de-alate *Termes bellicosus* the morning after a nuptial flight, and I have even seen them tackle a fair-sized Noctuid larva.

VI. HEMIPTERA.

The Procryptic Appearance and Attitude of certain Hemiptera on an "Ant-tree."

[Unfortunately no specimens were sent and the species cannot be identified. Dr. G. A. K. Marshall thinks it is fairly certain that the species was a Pentatomid, for this family includes several W. African species that frequent tree-trunks and are more or less lichen-like. *Atelocera* is perhaps the most likely genus.]

March 20, 1915.—I found some very curious bugs the other day on a tree here. Perhaps Lamborn sent you them before. The nymphs were resting on the lichen-covered bark of a large tree and looked greatly like a large scale insect; they rested on the surface absolutely motionless, and were so like the lichen that I failed to notice them during a considerable interval during which I was looking at some ants which nest in that particular tree. The ants did not seem to mind them. So perfectly quiet were they that I thought they were large scale insects. Concealed in deep cracks on the bark I found some of the mature bugs, not so well protected as the nymphs by their colour. This protection, in virtue of their power of flight, and their odour when disturbed, the adults would not require, though they were by no means conspicuous. They rested in groups of three or four together.